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USSR Report

ENERGY

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19 JUNE 1986

USSR REPORT

ENERGY

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OIL AND GAS

SEARCH FOR OIL, GAS CONTINUING IN TYUMEN

Geologists' West Siberian Strategy

Moscow NEFTYANIK in Russian No 2, 1986 pp 14-15

[Interview with V. P. Shcherbakov, chief of the Administration for Oil and Gas, member of the Collegium of the RSFSR Ministry of Geology, candidate in Geological-Mineralogical Sciences, at the beginning of the 12th Five-Year Plan, on the work strategy of geologists in Western Siberia, by A. Zenkov, correspondent for the Press-Center of the USSR Ministry of Geology, "A New Approach Necessary;" precise date and place of interview not given]

[Text] [Question] Vladislav Prokhorovich, today over half of the all-union extraction of oil and gas falls to the account of Tyumen Oblast. What are the perspectives for this region? Will it continue in future to yield as much fuel for the country?

[Answer] The plan for the basic directions of USSR economic and social development in the 12th Five-Year Plan and during the period up to the year 2000 specifies that the oblast maintain a leading role in providing the country with oil and gas. Moreover, a further increase in the volumes of exploration and extraction of these types of fuel, approximately double as compared with today's indicators, is outlined. These plans are based on the firm assurance of the majority of the scientists: Tyumen has reliable reserves. It is another matter that further development of the region requires a different, I would say new in principle, approach to the business. After all, in the future we will not have to count on deposits "lying on the surface". The depths are being increased and consequently, also the efforts necessary to prospect and extract the fuel.

The problem arises before us: what path to take? If it is along the beaten path, using traditional methods, in principle, so to speak, the "shortest road is the familiar one", then a substantial increase in material and physical expenditures awaits us. But what if it is along a new way? Without denying the role of the many-times tested methodologies, one should say that the developments on which numerous scientific collectives in the sector are now working inspire assurance that the future of Tyumen Oblast is inseparable from the development of scientific-technical programs.

[Question] Tell us please in a little more detail of the directions that our developments are taking?

[Answer] The entire process of geological exploration can conveniently be divided into three stages: seismic exploration, searching-evaluative drilling and prospecting deposits with deep wells. In the near future we will direct our main efforts toward improving the existing technology of the first stage. This is related to the fact that prospecting the deposits under the conditions of Tyumenskiy Kray directly is a process which, even though well studied, is the most labor-intensive and expensive. Each well costs over a million rubles, and the prospecting of the entire deposit runs into tens of millions. The practicable way out is to intensify the role of less expensive geophysical methods which have great potentials.

Up to now the results of the seismic exploration work were primarily structural, that is the topographical characteristics of the earth's interior, and not the composition or saturation of the rocks. In other words, seismic exploration has made no claim to the activity spheres of exploratory drilling proper. In the near future the situation will change. We are counting on the possibility in principle appearing for predicting a geological profile (PGR). This new advanced method is based on broad use of the latest model studies of seismic stations and systems of information processing. It will give immeasurably more complete data on the geology of the earth's interior as early as the stage of searching the deposits.

Increasing the information content of geophysical work is a very important task. If there were success in radically raising the quality of work at this stage, we could save tremendous capital investments, avoid the errors that are still encountered in determining the places for laying the wells and shorten the periods for preparing the deposits for development. For this purpose we more and more often combine the stage of prospecting the deposit with its industrial development.

[Question] A few words on the work of the scientific institutions engaged in developing the new methods and technology. How does the future of Tyumen appear to you in this aspect?

[Answer] The research is being carried out by scientific collectives in three basic directions, respectively in geophysics by the West Siberian Scientific Research Institute of Geophysics, in drilling by the West Siberian Scientific Research and Planning Institute for Drilling, and in geology by the West Siberian Scientific Research Institute for Geological Science. Today we confront the need to promote the intensive development of scientific-technical programs in geophysical research of deep wells. Having combined all the scientific-research institutes of Tyumen into a single scientific center, we could give a powerful impetus to the development of all directions of geological-exploratory work on the basis of a balanced, well thought-out association of scientific forces with production. This would also make possible more intensive introduction of the achievements of scientific-technical progress.

Tyumen Oblast is an active work field for scientists and specialists and at the same time not only for a strictly geological direction. Automated information, its transmission to digital recording for an electronic computer unit and processing in accordance with special programs--without this today's work on prospecting oil and gas in Western Siberia would be unthinkable. In the future we should be enabled at any time to receive precise information on any section of the Tyumen region. Under the conditions of the tremendous, difficult distances of the terrain, this task can be solved only by using the latest achievements of scientific-technical progress, and this means with the participation of specialists of the most modern professions as well.

[Question] Increasing the oil yield from the beds, drilling super-deep wells and developing new, as yet unstudied territories--along which of these paths will our future approach to the region be carried?

[Answer] It appears that it would be wrong to be directed exclusively toward a single course of any kind. All paths are urgent to develop such an extensive region. Unquestionably, the task of increasing the oil extraction from the deposits prospected is a matter of primary importance. The significance of this problem for development of the country's fuel-energy base compels us to seek paths for its solution not only from scientists connected directly with the extractive branches, but also from us, the geologists. In my opinion, we cannot in this case dispense with the active use of science fundamentals. We need qualitative leaps ahead in using certain new methods of action on the beds. Western Siberia also has territories that have been little-studied. About 80 percent of the region has not yet been thoroughly studied, and this particularly pertains to the northern sections of the kray. Undoubtedly the role of deep and super-deep levels in Tyumen will increase. The complex geological structure of the northern oblast determined the choice of a site for laying the first super-deep exploratory well near Urengoy in Western Siberia. According to the proposals of scientists, the study of 5-6 kilometer and deeper depths will make it possible to form in principle new opinions on the oil and gas content of the province.

As you can see, that is what we have to work on seriously and where we should exert our efforts. In the new five-year plan we are faced with drilling 14 million meters of wells on the territory of Tyumen Oblast. Given reliable prediction and precise selection of the site for each well and the maximally possible extraction of oil and gas from the earth's depths, this will be an important contribution to the development of the country's fuel-energy base.

West Siberian Drilling, Extracting Equipment

Moscow NEFTYANIK in Russian No 2, 1986 pp 15-16

[Article by V. Gurevich, director of the Coordination Division of the All-Union Scientific Research Institute of Petroleum Machine Building: "The Stores of Drillers and Extractors"]

[Text] The Western Siberian oil and gas complex produces over 60% of the oil and over 50% of the gas in the country and is one of the main consumers of machines and equipment for drilling and operation of oil and gas wells.

Oil and gas industrial equipment differs through its great diversity and broad products list, which consists of over 300 types and 3000 type sizes of equipment and tools: from rock-crushing tools to powerful drilling rigs.

The main supplier of this equipment is the Ministry of Chemical and Petroleum Machine Building.

In the 11th Five-Year Plan the volume of production of oil and gas industrial equipment increased by 44.5% and by 1990 it is planned for an increase of an additional 45% as compared with 1985.

The sector regularly carries out the expansion and up-dating of the products list of equipment and tools and a rise in their technical level, quality and reliability.

The geological prospecting, drilling and oil and gas extracting equipment produced by the enterprises of the Ministry of Chemical and Petroleum Machine Building is on the whole at the modern technical level. Over 50% of this equipment is produced with the State Seal of Quality.

In 1981-1985 the enterprises of the ministry manufactured 181 experimental models of oil and gas industry equipment with a heightened technical level and developed series production of 147 types of new equipment and took 68 items of obsolete equipment out of production. The machine builders developed production of slow-speed screw bottom hole motors and reducer pipe drills and has set up the output of drilling bits with hermetically sealed oil-filled supports for sliding and outfitting with greater stability.

As the result of the combined work of manufacturers and consumers, the average footage per drill bit in operational drilling increased 2.5-fold from 1974 to 1984.

Circulation systems with three-stage cleaning of the drilling liquid have been created and developed by series production, and ensure the removal of particles of drilled-out rock up to 0.05 mm in size. The introduction of these systems has made it possible to increase the mechanical drilling rate by 20%, reduce the input of reagents by 15-20%, cut the outlay of spare parts for the drill pumps in half and reduce the number of accidents and complications during drilling.

The production of a new automatic wrench type AKEU to screw and unscrew the drilling and casing pipes is being developed and considerably increases the labor productivity of the drill workers and ensures complete work safety.

The production of three types of units to cement wells, with an increased (by 20%) unit capacity, lower relative metal-intensiveness and higher reliability indicators have been developed. These units are made in block form, which is particularly important for the conditions of Western Siberia and the North.

Advanced one-piece cylindrical sucker-rod pumps with less metal-intensiveness and a greater work capacity (by 12-15%) as compared with the earlier manufactured modified units constitute 45% of the total volume of pumps of this type produced.

Improving the technology of manufacturing the parts has considerably increased their reliability.

Due to the development of new units with immersion centrifugal pumps type UETsN, corresponding to today's technical level, the between-repair period for their operation has reached 450 days.

A complete unit for gas-lift extraction of oil and well equipment for the operation of vertical and sloping wells has been created and is being developed by production.

The manufacturing quality of the equipment, however, in a number of cases does not yet correspond to the growing requirements for its operation under present-day conditions. In accordance with the designation indicators for analogous foreign models, individual types of domestic equipment are inferior to them with respect to the quality of manufacture, metal-intensiveness, energy-intensiveness and the degree of automation.

Specific and effective measures were recently adopted to raise the quality of the goods produced, reinforce industrial discipline and intensify plant monitoring. Acceptance of goods by the consumers was organized at a number of enterprises. Brigades of specialists from scientific research institutes, design bureaus and plants in the sector were sent on assignment to oil and gas enterprises in Western Siberia. Together with the oil workers they developed detailed measures to raise the technical level, quality and reliability of the equipment, which are at present being efficiently put into practice by the machine builders.

For example, the oil workers had many reprimands concerning the quality and reliability of automated machines to screw and unscrew pop-compressor pipes and mechanical switches (KMU); the technical documentation for these items was revised in consideration of all the observations of the operations workers.

In 1986 four support bases are being created for service maintenance (in Surgut, Nizhnevartovsk, Noyabrsk and Nyagan), which will perform start-up and adjustment work and technical service for the equipment in the course of the guarantee period of the work, replace parts and assemblies that have got out of order in the process of operation and carry out authorial inspection and supervision, in conjunction with the specialists of the Main Administration for Oil and Gas in the Tyumen Region, of adherence to the technical requirements for storage, transport and operation of oil and gas industry equipment.

In a number of cases the completing items supplied by the ministries and related industries have a negative effect on the technical level and quality of the end product. This primarily pertains to the transport base of the units and aggregates for drilling geological prospecting wells, developing and repairing oil wells and mechanization of the industrial work. Up until now practically no

wheeled transport bases have been created with the necessary load-lifting capacity and an increased installation area, nor marsh-vehicles for the conditions of Western Siberia.

The necessary control-measuring instruments such as, for example, instantaneous density gages and flow meters, vibration-proof pressure gages etc. are not being produced. The durability of rubber-industrial packings and lines for vibrating strings and the precision of rolled billets for pipelines and immersion and sucker-rod well pumps are inadequate.

With a view to a further rise in the technical level and quality of oil and gas industry equipment, in the 12th Five-Year Plan 20 comprehensive programs were developed to create new oil industry equipment, modernize the equipment being produced and take obsolete equipment out of production. They specify the creation and development of series production of 189 new types of equipment, modernization of 148 types and taking 76 types of obsolete equipment out of production.

Production will be developed of a number of new bottom hole motors with a reserve of up to 1000-1200 hours and considerably greater running time before breakdown, rock bits with a 1.5-2-fold increase in operational stability, circulating systems with a four-stage cleaning system, highly mechanized aggregates to develop and repair wells with a load-lifting capacity of 50, 80 and 125 tons, with increased passability and optimization of the industrial processes on the basis of using microprocessor equipment. The between-repair period of immersible centrifugal electric pumps will be increased to 13,200 hours, of screw immersible pumps to 8700 hours and sucker-rod single-piece-cylinder pumps to 9600 hours.

The enterprises of the sector are to develop production of automated hydraulic piston units and diaphragm pumps and centrifugal pumps to inject the industrial and hydrogen-sulfide-containing drainage waters. Five complete units of gas-lift equipment will be modernized and automated complete-block compressor stations will be created for gas-lift extraction of oil.

Increasing the block nature, completeness and degree of plant readiness will be the basic direction for raising the technical level of the equipment, which is of greatest significance for the oil workers of Western Siberia and other northern regions.

M. S. Gorbachev, general secretary of the CPSU Central Committee, pointed out during a visit to the Western-Siberian Oil and Gas Complex, that the successes and failures of the oil workers and gas workers depend to a great extent on the machine builders.

Putting into practice the programs outlined for the 12th Five-Year Plan will make it possible to raise the technical level of oil and gas industrial equipment as well as the technical-economic indicators for oil drilling and extraction.

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COAL

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MECHANIZATION OF COAL-CLEANING IN DIFFICULT GEOLOGICAL CONDITIONS

Kiev UGOL UKRAINY in Russian No 9, Sep 85 pp 2-5

[Article by A.G. Laptev, candidate of technical sciences, director of the Don State Institute for Coal Machinery Design]

[Abstract] The Energokompleks program is aimed at improving the efficiency of the coal industry by introducing new types of machinery and processes. Much of the institute's work within the program is involved in creating machinery and equipment for preparatory operations. The article describes the specifications and testing of shaft-driving complexes, a seam-cutting machine and drilling equipment. Pneumatic and electrical drills are described along with their performance specifications and economic effects. New shaft-drills are presented to replace older models. New winze-sinking machines are described. The institute is also developing a compact machine complex that can sink connective shafts. Experience with the use of some of this machinery at mines in the Lvov-Volynia coal basin is discussed where it was found that the new models are more productive, reduce work time and save money. The institute has created a coal-cleaning complex which was successfully tested and accepted for series-manufacture. The complex can be operated in shafts with dangerous gas and dust conditions and in places inaccessible to other machinery. The institute is also working on the creation of new equipment for removing coal from sharply-inclined seams. This machinery is automated and does not require the constant attention of operating personnel. 6 figures, no references.

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NUCLEAR POWER

REPORTS OF CONSTRUCTION, OTHER PROBLEMS AT AESES

The following items relating to construction and operational problems at Soviet nuclear power plants have recently appeared in FBIS Soviet Union DAILY REPORT:

CONSTRUCTION PROBLEMS NOTED [AT CHERNOBYL AES] 1 May 86 p R4
LAX CONSTRUCTION STANDARDS AT ROSTOV AES CRITICISED; 1 May 86 p S1
KIEV PAPER OUTLINES CONSTRUCTION PROBLEMS AT CHERNOBYL; 6 May 86 p S1
CONSTRUCTION DELAY REPORTED AT KALININ NUCLEAR PLANT; 8 May 86 p S10
CRITICISM OF CRIMEAN AES DIRECTOR REPORTED; 9 May 86 p S1

CSO: 1822/267

NUCLEAR POWER

PROBLEMS IN CONSTRUCTION OF KHMELNITSKAYA AES

Moscow STROITELNAYA GAZETA in Russian 16 Mar 86 p 2

[Article by G. Dolzhenko (Khmelnitskiy) under the rubric "Party Control Over Construction": "Overcome the Inertia; Notes From a Session of the Party Obkom Buro"]

[Text] "We cannot advance a single step if we do not learn how to work the new way, if we are not able to overcome stagnation and conservatism in any of their manifestations, and if we lose the courage to soberly evaluate the situation and see it as it really is"--these words from the Political Report of the CPSU Central Committee to the 27th Party Congress are today the basis of the activity of all labor collectives and party and trade-union committees and organizations. And the buro of the party's Khmelnitskiy Oblast Committee is acting in the spirit of irreconcilability toward deficiencies. We tell today about one of the buro sessions, at which progress in erecting the Khmelnitskaya Nuclear Electric-Power Station is examined.

Somewhere, some distance from Atomgrad, bulldozers rumble, cranes call here and there, and minute electric-welding "suns" blaze. There, above the ancient Gorin stream, the skeletons of the Khmelnitskaya Nuclear Electric Power Station rise up.

Startup of the first power unit, planned for 1984, did not come off. It was rescheduled for the next year, 1985, but that move also ended unsuccessfully. One year postponed brings the country's economy enormous losses. And the moral damage that arrhythmic operation and interruption in the fulfillment of plans and socialist commitments bring to collectives? How is that to be evaluated? That is why progress in erecting the AES was subjected to thorough analysis at a recent session of the buro of the party's Khmelnitskiy Oblast Committee, to which a large group of USSR Minenergo [Ministry of Power and Electrification] supervisors under Deputy Minister A. Semenov, and also chairman of Goskomatomenergonadzor [State Committee for Safety in the Nuclear Power Industry] Ye. Kulov, had been invited.

It must be said that this construction project has been unlucky from the very start. Interruptions in supply and deficiencies in organizing the work and

recruiting personnel have caused creation of a base to be stretched out for long years. Not having reliable support entities, the contracting subunits have striven with all their might to pick out the most profitable operations at the main sites. There have not been enough concrete, brick, metal and prefabricated structure. Brigades have been idle for whole days.

It is not difficult to guess that there is not enough operating time left for physical startup of the power unit this year. And although the plan calls for a reduction in the stages of operation and the completion thereof by the end of December, chief of the AES Construction Administration Ye. Bazhenov and Party Committee Secretary O. Lapko were not able to answer persuasively at the meeting of the buro of the CPSU Oblast Committee whether the reactor will be started up.

The supervisors' lack of confidence has engendered a lack of faith within the collective. The tenseness of ardent competition that precedes the startup of large facilities is not being felt at the construction project. What is more, where will it come from if you do not find a slogan or a competition screen at the site, you do not hear information on the radio about affairs in the brigades, and you do not see a flag honoring the winner? Social organizations are drowning in paper activity.

"In order to light up the nuclear firebox on time," First Secretary of the CPSU Oblast Committee V. Dikusarov stressed, "one must be aroused and a spark must be lit in people's hearts."

An atmosphere of relaxation and low work discipline has not helped to promote shock work since the first of the year. Poor preparation for the winter testifies to this. Many premises were left uncovered. A group of workers approached Deputy Minister A. Semenov in the machine room the day before the buro meeting. Steam poured out of their quilted jackets, from tears in the roof it had come down in buckets. "We have built many stations throughout the country," brigade leader P. Marchenko of the South-Ukrainian Administration of Teploenergomontazh [Trust for the Installation of Heat-Engineering Equipment] expressed the general opinion with bitterness, "but we have not encountered such an attitude toward people and equipment."

No little misfortune has piled up. But the deeper you look into it, the more obvious it becomes: the roots of the current confusion must be sought in the labyrinths of the ministry's staff. In October 1983 USSR Minenergo issued Order No 310 on measures for insuring introduction of the first power unit at the Khmel'nitskaya AES in 1985. It was planned to complete the turn-over of all engineering documentation in 1984, to erect all four units by the flowline method, to organize the integrated mechanization of installing operations, to rely upon construction organized on the basis of an ASU [automated control system], and to eliminate the lag. Appended to the order was a list of basic thesis-type tasks. But all the good intentions remained on paper, since they were not reinforced by concrete actions. In November of last year an order by Deputy Minister G. Shasharin arrived which makes changes in the engineering documentation that considered experience in erecting the Zaporozhskaya AES. They have come in a continuous stream since

then, and the end is not in sight. Last year alone 163 changes were made in the design which required that 507 tons of nonquota metal structure be ordered. The schedule for flowline type construction is not being sustained and there is not a trace of ASU--all the information is hand-processed. And is there anyone in the ministry who is held accountable for nonfulfillment of the order? No. Moreover, in April last year G. Shasharin and A. Semenov confirmed new measures, but they also, as we know, remained on paper. In brief, at most construction projects, the schedules and thesis-type plans are not being observed.

The practice of planning an increase in construction and installing work without adequate preparation and in establishing the materials base necessary for its fulfillment has prevailed within Minenergo. Such a situation has been observed not only at Khmel'nitskaya but also at the Krymskaya, Chernobyl'skaya and Yuzhno-Ukrainskaya AES's and the Odessa ATETs [nuclear heat and electric-power central].

Equipment frequently is shipped directly from the plant, not to the project for which it was intended but to another one, one with a higher state of readiness. The intention would be in general commendable if it is not considered that the builders at those projects from which shipment of the equipment had been diverted slowed down their pace because they had nothing to install. Such a vicious circle presses down on the schedules like a powerful roller, breaking the rhythm and reducing the efforts of thousands of people to naught.

Outmoded stereotypes of economic thought hold sway also in the solution of other questions, personnel in particular. As First Secretary of the Slavuta party Gorkom A. Arkhipov noted, Minenergo often sends to the construction project as supervisors people whose morale and businesslike qualities are untested, and they compromise themselves from their first days. In the past three years seven deputy chiefs of the construction administration and more than two-thirds of the subcontracting-organization supervisors have been replaced. A severe shortage of workers and of operating personnel is being felt at the nuclear station.

Secretary of the Ministry's Party Committee V. Korobov, who was present at the buro meeting, gave assurances that communists of the branch's staff had invested maximum efforts toward a restructuring of their work and elimination of those deficiencies that were talked about at the buro meeting. One of the first steps will be a hearing at a committee of the supervisors who are responsible for erecting the Khmel'nitskaya AES. A very timely measures, it would seem.

At the buro meeting, Secretary of the party's Obkom P. Mazharov directed attention to the necessity to raise the fighting spirit of the construction project's party and trade-union committees, to use advanced forms and methods of work more completely, and to strengthen discipline. A. Trotsenko, director of the AES that is being built, proposed to cut the time for startup and setting-up operations, to organize work in three full shifts, and to struggle for a tightening of the schedule, if by only a few hours per day. The speeches as a whole come down to one thing--physical startup of the first

power unit by the end of the year is possible, despite the extremely difficult situation. This solution also is the basis for the buro's resolution. STROITELNAYA GAZETA will tell in one of its issues how the supervisors of the construction project and the ministry keep their word.

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CSO: 1822/238

NON-NUCLEAR POWER

EXPLOSION REPORTED AT GRES IN GEORGIA

Tbilisi ZARYA VOSTOKA in Russian 2 Apr 86 p 4

[Article from GRUZINFORM: "Conquerors of the Fire: An Event of Major Proportions"]

[Text] On 27 March at 2115 the city of Tkvarcheli was suddenly plunged into darkness. The electric power supply to the mines, to many industrial enterprises and organizations, and to the city's population was cut off. At the same moment a powerful explosion resounded at the Tkvarcheli GRES, and bluish-white flashes, like lightning, lit up the sky.

For reasons still unknown (a special commission is looking into it) a power transformer was short circuited. Highly inflammable machine lubricant leaked out of a voltage arc of the unit and burst into flames. In a matter of seconds the fire travelled to a cable channel and spread to the next transformer. The power plant was faced with grave danger: if the fire was not prevented from spreading further, it could involve a row of four other transformers and get into the main building of the GRES.

The first to enter the battle against the raging fire was a fire-fighting unit of the Tkvarcheli Municipal Department of Internal Affairs. Quickly coming to their aid were fire fighters from Ochampire, Gali, Sukhumi, and Gulripshi, and combined teams of workers from Tkvarcheli's industrial enterprises.

The combat with the raging fire lasted two and a half hours, but the people stood up to it and conquered it.

Distinguishing themselves in the fire fighting were N. Delba, E. Khashba, B. Achba, R. Pachuliya, A. Adleyba, Yu. Chernozhukov, S. Morozov, and V. Kulava. Fighting the fire at the hottest points were the power plant workers, locomotive mechanic I. Dzhindzholiya, shop foreman V. Maglakelidze, laboratory workers G. Luchko and V. Vershinin, and automatic-heat-machinery shop foreman M. Gvazbaya.

Nonetheless, the city's central power distribution post was basically put out of service.

The staff to eliminate the aftermath of a fire, which had been set up in the

Tkvarcheli party gorkom, functioned precisely and efficiently. The miners were gotten out of the mines on time. All steps were taken to ensure that by morning the city's transportation, industrial enterprises, stores, and eating facilities would start working without interruption. And in fact, by the next day the city was back to its normal work-oriented life.

At the request of ZARYA VOSTOKA's correspondent, Yuriy Chednya, chief of the Main Industrial Administration of Power and Electrification (Gruzglavenergo) of the Georgian SSR, has commented on this event:

The fire occurred because of internal damage to a transformer that had been operated beyond its design lifetime. The Tkvarcheli GRES is the oldest power plant in the republic, and has been undergoing regular rebuilding and replacement of obsolete equipment with new and up-to-date equipment. However, this rebuilding was being done under difficult circumstances, since the power plant's operations were not shut down even for a minute.

The damaged transformer and several other pieces of equipment were due for replacement. In fact, a reserve transformer had already been brought in, and the replaced one was being taken out of service. Also to be updated were such major GRES units as the chemical water purifier, heat exchanger, gas ducts, and others. It was planned that the reconstruction would be completed and the power plant brought up to design specifications by 1988.

As soon as we learned what had happened at Tkvarcheli, we at Gruzglavenergo immediately set up a damage control staff, which determined the extent of the accident, announced a specific plan of action, and worked out a timetable to restore normal operation of the GRES. Within four hours of the outbreak of the fire leading specialists were flown to Tkvarcheli on a special flight that was efficiently organized by airline personnel. Brigades of electrical installation and repair personnel were sent there from all parts of the republic.

By the morning of 28 March trucks started to arrive one after the other with equipment, cable, and gear. Shortly afterwards the GRES received power from its power system, and a reliable power supply was established for Abkhazia.

Every sector at the GRES was operating on its prescribed schedule.

Playing an active role in the restoration of the cable lines and switching gear were the workers of the Georgian Civil Aviation Administration, of the Tkvarcheli Mining Administration of the Gruzugol Production Association, of the Gruzselektrosetstroy Trust, of the Sukhumi Electrical Network Enterprise, and of several other organizations.

At 1400 voltage was supplied to the Tkvarcheli mines and to the population in several miners' settlements. On the evening of 28 March all customers were being supplied with power from the power system, and shortly afterwards the power plant was restored to normal operation.

Under these extreme conditions all the workers and specialists engaged in restoration work enjoyed the aid and support of the republic's government

agencies, and of the Abkhaz obkom and the Tkvarcheli gorkom of the Georgian Communist party.

What conclusions can be drawn?

In connection with what has happened Gruzglavenergo considers it essential to lay before the USSR Minenergo [Ministry of Power and Electrification] the matter of accelerating the rebuilding of the Tkvarcheli GRES and eliminating the construction and installation imperfections that have had a negative effect on the progress of updating the power plant. Preventive work must also be rapidly undertaken regarding additional fire prevention measures.

The Gruzglavenergo collegium is taking specific steps that will make it possible to prevent similar breakdowns.

12697

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NON-NUCLEAR POWER

CONSTRUCTION DELAYS AT SOUTH KAZAKHSTANSKAYA GRES

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 13 Mar 86 p 3

[Article by Correspondent A. Iseyev under the "Line of Fundamental Directions" rubric: "Energograd, Exist! - Today at the Site of a Thermal Power Plant in the Pribalkhash Steppe"]

[Text] "Expand construction ... at the South Kazakhstanskaya GRES" (from the fundamental directions for economic and social development of the USSR between 1986-1990 and in the period to 2000).

This very important document exactly and comprehensively expresses the central idea concerning the South Kazakhstanskaya GRES. Today the work there is really not developed widely enough. Everything which has happened until today can be called the prehistory of the future energy giant of South Kazakhstan.

The first construction workers turned up in the area of Lake Balkhash in the 1970's. This is the Moyynkumskiy Rayon, near the Chiganak railroad station. While previously trains only rumbled through here, disturbing the unpopulated desert silence with their whistles, today silver towers for suspended power lines have been erected. Passing beneath them are large capacity dump trucks, and earth moving equipment is constantly on duty.

The South Kazakhstanskaya GRES is a sister to the stations which make up the Ekibastuz Fuel and Energy Complex. They provide electric power to economic regions located hundreds of kilometers to the north and south away from the power center. In other words, the Taldy-Kurgan, Alma-Ata, Dzhambul, Chimkent, Kzyl-Orda oblasts of Kazakhstan and Northern Kirgiziya are supplied by the South Kazakhstanskaya GRES and by transfers from the unified power grid with enough electric power for their development.

There will be eight power units at the plant, each with 500,000 kiloWatts capacity. The estimated cost of the station is 1,373,000 rubles. Today the South Kazakhstanskaya GRES is the largest construction site in the south of Kazakhstan.

How goes construction of this project, where construction management for the South Kazakhstanskaya GRES is provided by the "Sredazenergostroy [Central Asian Power Construction]" Trust, a part of Glavvostokenergostroy [the Main

Directorate for Construction and Installation of Thermal Electric Power Plants in the Urals and Siberia] of the USSR Ministry of Power and Electrification (Minenergo). The trust is headed by V. P. Shterbov.

Natural conditions here are extreme. This is a typical arid desert. In winter there are penetrating cold winds, and in summer heat. For hundreds of kilometers around there are no large populated points. If one were to draw a circle with a 400-450 kilometer radius around the site, on the perimeter would lay the cities of Alma-Ata, Frunze, and Dzhambul. And in the center of the circle would be the Chiganak railroad station, and a few kilometers from it, the South Kazakhstanskaya GRES construction site.

There was not a single unit handed over here until 1983. Then there appeared several prefabricated two-story houses. A power plant was started up, and several storage areas were built. A 232 kilometer long 220 kiloVolt power line was strung from Chu to Chiganak. The "Chiganakskaya" substation with two transformers was built, as was a 64-seat dining facility, a two-stage pump station, and two aqueducts. Last year saw the construction of a 90-apartment residential building and a 320 place child care facility. The most significant occurrence in the final year of the Five-Year Plan was the construction of an ORU-220 kiloVolt outdoor distribution system. It was built to transfer power from the Central Asian Power Grid to Alma-Ata. Fine work was done by building crews headed by A. Larkin, V. Velikandrova, and L. Yemelyanova. Subcontractor organizations which were highly valued included those of Section Number Eleven of "Gidrospetsstroy [the State All-Union Trust for the Reinforcement of Foundations and Structures of the Main Administration for the Construction and Installation of Hydroelectric Power Plants in the Central and Southern Regions (Glavgidroenergostroy)]" and electricians from the Chimkent Directorate of the Sredazenergostroy Trust. The 1985 program for general contracting, however, remained unfinished.

There are a number of things that are delaying construction. There are supply and organizational shortcomings. The construction directorate did not assume the force it needed. The balance sheets for implementing capital expenditures and the plan for construction work for the years of construction are deplorable. Rather than capital expenditures of 56.4 million rubles, only 37.5 million have been implemented. And only 30.6 million of the 41.5 million rubles planned for construction and installation are implemented. Every year unrealistic work volumes and completion schedules are programmed. There are constant changes to the expected completion dates of one and the same projects.

Last year the schedules called for completing vertical planning for the plant site, and expanding the base installation for contractor organizations. This was not done. Railroad lines to the GRES site and the individual units are being laid slowly. Material, earth moving equipment, and motor transport are poorly supplied. There are delays in the tempo of replanning for equipment which can use hard coal with 56 percent ash content instead of 36-percent ash content. The Novosibirsk "Teploelektroproyekt (All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures)" did not provide the project drawings on time. There were corresponding changes in the time periods for confirming this documentation at the Kazakh SSR Minenergo.

A similar fate befell planning documentation for a number of housing projects and an industrial building. This was to be completed by "Kazgiprogradprom (the Kazakh State Planning Institute for [probably for Industry in] Cities)". The time ran out, but groups for work planning and author's oversight were not established for the GRES. A speed-up did not take place, although there was talk about introduction ahead of schedule of the production base and housing and providing the village and the projects with heat, water, power, and sewage. The pace of work lagged so far behind that during the 11th Five-Year Plan they did not manage to establish even the construction base.

Despite the snail's pace, to put it bluntly, the Construction Directorate (SU) for the South Kazakhstanskaya GRES (YuK GRES), the leadership of the Main Directorate, and the "Sredazheergostroy" Trust held to the course for start up of the first 500,000 kiloWatt power unit during 1989 and have planned to start up a second power unit with the same capacity the following year. Yet such tasking is clearly beyond the capacity of the station's builders.

A tendency on the part of the managers of the Main Directorate and the Sredaz-energostroj Trust to establish high goals without attaching material and technical resources and people to them became firmly entrenched last year. Once it was written, they considered it done.

How does the general contractor evaluate the deteriorating situation? His representative at the administration building for the station being built (the Director is A. M. Shpakov) evaluates it quite realistically. But, as the builders, the management scatters its attention, alluding to various excuses.

The unsatisfactory progress of construction could not avoid upsetting USSR Minenergo. So after the regular failure of plans for a number of projects and housing there appeared decrees concerning additional steps to accelerate construction. In them, the low pace of work is evaluated. Justified reproaches ring out addressed to the Kazakh SSR Minenergo and to Glavvostok-energostroy. They did not press for establishment of construction industry plants or their own bases. Then, as before, USSR Minenergo set up tasking. However these orders, which appeared more than one and one-half years ago, as before did not address the actual situation which had been deteriorating at the construction site.

Who will build the YuK GRES? One of the most urgent questions is that of providing personnel to the project. According to schedule, beginning in 1984 there was to have been an increase in the number of personnel, reaching 8,630 persons by 1989. But, just as in previous years, the assigned task was not realistic. The number of construction workers remains at a minimum level as before. And who will come here if there is no family housing or bachelor quarters at the site?

The legislative enactment for the SU YuK GRES and the management of the plant under construction contained plans to provide no fewer than 20,000 square meters of housing during the final year of the 11th Five-Year Plan. This decision remains a paper one. Also appearing unrealistic is the program for this year. The construction workers are supposed to deliver 50,000

square meters of housing. There is no way this tasking will be met. It is the notorious vicious circle: there are no people because there is no housing and there isn't enough housing because there is nobody to build it.

The most important thing right now is recruitment of personnel. It is indisputable that these people should be sought in the oblasts which will be provided power by the GRES. They should be sought by all possible means -- use of one's own forces, through the system for organizational recruitment, and through the Komsomol. If the oblasts provide 150-200 qualified workers each, then the rates of construction will be increased. But to do this it is first essential to build housing. This means it is necessary to build special worker villages, dormitories, and tent cities for summer use. The 1986 program for housing construction must be met and exceeded. It is essential that by the time the first power unit is received there must be more than 300 thousand square meters of living quarters at the power plant construction workers' village. This year the planning-estimate documentation calls for only 20,000 square meters. And what if the remainder arrives at the end of 1986?

It is necessary today to sharply ask the question: Is the SU YuK GRES ready to meet the year's program for housing construction of 50,000 square meters? From a meeting with the Directorate Chief V. P. Shterbov it becomes clear: It is not ready. What is to be done? As Shterbov himself states, it is essential to supplement that which is available with two self-supporting sections, so that one of them would work on installation of housing, and the other on finishing work. Several hundred persons are needed for this. And what if this task is handed over to the "special workers (vakhtoviki)" themselves? Let them build their own village, and then start to build the rest of the housing. And if this alternative doesn't work, then we have to find another. But we must not wait.

There is yet another difficulty -- a shortfall in delivery of reinforced concrete structural members for housing. Last year the Tom-Usinskiy Plant in Krasnoyarskiy Kray failed to deliver about 800 cubic meters of precast reinforced concrete structural members and the Yermakovskiy [Plant was short] 1,500 cubic meters. Last year's history could repeat itself.

Among the unresolved problems is that of safekeeping equipment for the GRES. It shows up at the Chiganak railroad station and is stored in a small area near the tracks, where there are no facilities for protecting the very valuable mechanisms. It would be much better to deliver them directly to a reliable storage site. But the railroad siding to the construction site has not been built, nor have the expected storage facilities. There is only a goods trans-shipment point which handled 764,000 rubles for all these years. And this sum will grow before the siding is built.

But the pace of construction on the railroad branch line from the main tracks to the construction site and the Kayratkol station, the place where the siding cuts away, is very slow. Out of 11 million rubles allocated for establishing railroad service to the GRES, only 1.5 million rubles have been completed.

And the problems do not end here. It is not clear how the railroad station will be connected with the construction site. Because of this they are unable to start building the mazut tanks. On the whole, the chain of unresolved questions is getting longer for the construction of many structures due to violations of sequencing. "Hanging" in the air is the solution to the problem of engineering networks for heat lines, water lines, and sewage. Leaders of construction and the GRES management, as well as the arriving supervisors from the "Sredazenergostroy" Trust would like to change the situation, but no further conversations about substantial changes are taking place.

Construction of a production depot for subcontractor organizations has moved ahead but a little. All the construction vehicles and equipment are sitting under the open sky.

The USSR Ministry of Power and Electrification has been tasked with a program of action for upcoming years. There is an anticipated acceleration of construction at the YuK GRES. The main thing is to get started on the power capability of 500 thousand kilowatts by 1990. At the center of attention remain the questions of the enterprises' structure for the construction industry, the housing construction combine in Dzhambul, and the increase in the capacity of the Karagandinskiy Reinforced Concrete Articles Plant in the village of Topar and of the Alma-Atinskiy and Yermakovskiy Reinforced Concrete Structural Members Plants. USSR Minenergo and Mintyazhstroy [the Ministry of Construction of Heavy Industry Establishments] are tasked to complete during 1986-1990 the construction of the worker village at the South Kazakhstanskaya GRES with all buildings for communal use -- in a word, to build a power city.

In order to attract young people here it is essential, in our view, to declare this a Komsomol structure, and to send the best of the young workers here. To increase the attention of Communists to this matter it would help to create a unified party committee which would head the competition in the labor collectives and would occupy itself completely with matters of education.

It is obvious that it is essential to think about the problem - should the construction of the YuK GRES be placed under party control of the Chuyskiy City Party Committee? Such a solution would fully answer the needs of the matter, since the specifics of the Moyunkumskiy Rayon, on whose territory the GRES is being built, is not allowing the workers of the rayon party committee to scrutinize deeply from all sides the problems of construction.

A great deal of attention to this very important project of the 12th Five-Year Plan should be paid by the Dzhambul Oblast Party Committee. There should be personal visits to the construction site by the leaders of Minenergo USSR, and by Glavvostokenergostroy. It is time to establish a power construction trust here, which would be capable of accomplishing in the established time frame that amount which is allocated for construction of the South Kazakhstanskaya GRES.

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NON-NUCLEAR POWER

OFFICIALS RESPOND TO CRITICISMS OF KAZAKH POWER CONSTRUCTION

Minister Proposes Solutions

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 27 Apr 86 p 2

[Article by V. Kazachkov, minister of power and electrification of the Kazakh SSR: "'The Power Industry: Problems and Solutions'. A Reprise"]

[Text] Under this headline an article was published in KAZAKHSTANSKAYA PRAVDA on 15 January, which gave an extremely unfavorable evaluation of the status of power construction in Kazakhstan. Minenergo [Ministry of Power and Electrification] of the Kazakh SSR has fully studied this critical evaluation of the state of affairs that has developed.

For example, in the electric power sector, despite the yearly worsening shortfall in electric power, the funds allotted for the sector's development have not been utilized because of inadequate capacities of construction and installation organizations and shortcomings in material and technical supply and in the level of management. In the 11th Five-Year Plan, of the 834 million rubles planned, 720 million rubles were utilized in construction and installation operations, versus 815 million rubles actually utilized during the 10th Five-Year Plan.

The 12th Five-Year Plan sets for Kazakhstan still more intense tasks connected with the construction of the Ekibastuzskaya and Yuzhnokazakhstanskaya GRES, further development of the hydroelectric resources of the Irtysh River, the heating of cities by building heat and power plants and heating networks, further electrification of the rural economy, conversion of railroads to electric traction, and developing oil and gas fields in the vast unpopulated desert regions of Western Kazakhstan.

Power construction in Kazakhstan is now being accomplished by the forces of 35 trusts and administrations of 9 union and 10 republic ministries. Of this, the forces of three general contractor glavks [main administrations] and associations of USSR Minenergo are carrying out 65 percent of the construction and installation work; involved in executing this program are the forces of their eight trusts, as well as units of specialized organizations of the union ministry. About 20 percent of the work is being done by two trusts and two SMU [construction and installation administrations] and the economic resources of the power system of Minenergo of the Kazakh SSR.

Minenergo of the Kazakh SSR feels that one reason for the unsatisfactory progress of construction in the republic is the fragmentation among numerous glavks of USSR Minenergo, which do not regard their work as important, and deal with their problems piecemeal and formally. The glavk management has no feel for the needs of the republic's national economy, does not participate in the power systems or in the republic ministry, is extremely reluctant to meet with Kazakh power engineers when they are in Moscow, does not know much of the state of affairs on their construction projects, and gives them little aid.

Despite the well known requirements to accelerate the development of the Ekibastuz power complex, there has been a considerable falloff in the attention of Glavvostokenergostroy [Main Administration for the Construction and Installation of Thermal Electric Power Plants in the Urals and Siberia] to these matters. Where in 1982 the Ekibastuzenergostroy Trust utilized nearly 79 million rubles on construction projects of Minenergo of the Kazakh SSR, while year after year not fulfilling the plans, in 1985 it reached the level of 59 million rubles. This glavk has been in no hurry, either, to reinforce the Sredazenergostroy Trust, which, in addition to building or enlarging several heat and power plants, has been assigned to build the Yuzhnokazkhstanskaya GRES.

All this calls for an unavoidable restructuring of the management of the republic's power industry construction.

However, considering that the entire industrial construction base, and the specialized subcontractor and supply organizations are directly subordinate to USSR Minenergo, it would not be sensible to transfer the contractor organizations to Minenergo of the Kazakh SSR.

For a radical improvement in the construction situation and tightening responsibility for the development of the republic's power industry, we believe that there should be set up within the union ministry a Soyuzkazakhenergostroy Association, as was done to accelerate power construction in the Western Siberian oil and gas complex, and to transfer to that association all the construction and installation organizations, plants, and bases of the union and republic ministries located in Kazakhstan.

The tasks set for the republic's power industry workers in the 12th Five-Year Plan require radical and prompt review of the structure of repair services to power enterprises.

The present existence of a large number of construction organizations which are subordinate to various ministries and departments causes substantial difficulties in organizing repairs, and increases the costs of performing them.

In order to improve the system of repairing the equipment of power plants, an order has been issued for power plants to expand their own repair personnel and to develop a base of industrial repair (PRP) of power system enterprises, which will make it possible for the capital and medium repairs of power equipment to be done with their own economic resources.

Performance of the work to rebuild, modernize, and technically reequip power plants has been entrusted to the appropriate contractor organizations of USSR Minenergo, Mintyazhstroy [Ministry of Construction of Heavy Industry Establishments], Minmontyazhspetsstroy [Ministry of Installation and Special Construction Work] of the Kazakh SSR, and other departments.

Kansk-Achinsk Construction Needs

Moscow STROITELNAYA GAZETA in Russian 2 Apr 86 p 1

[Article by V. Stepanov, secretary of the Krasnodar CPSU kraykom, under the rubric "In Line With the Main Directions": "As a Single Whole"]

[Text] "Put into operation the generator unit at Berezovskaya GRES No. 1 and coal mining facilities at Berezovskiy Open Pit No. 1, start construction of the Borodinskiy No. 2 Open Pit Coal Mine, and carry out other work to build up the Kansk-Achinsk territorial production complex."

(From the "Main Directions of the Economic and Social Development of the USSR from 1986-1990 and the Period up to the Year 2000".)

In recent five-year plans the development of energy-intensive industries has been slowed down. This relates mainly to a lag in the power supply and especially the heat supply to enterprises. USSR Gosplan and USSR Minenergo have set their course mainly toward the construction of hydroelectric power plants, and have slowed down the development of thermal ones. However, it is the power plants of KATEK [Kansk-Achinsk Fuel and Energy Complex], which operate on coal, that are called on in the long run to solve the problem of fully supplying Siberia with power and of setting up major new energy-intensive industries there.

Although KATEK is presently supplying the national economy with more than 40 million tons of coal per year, USSR Minugleprom [Ministry of the Coal Industry] and USSR Minenergo are not giving enough attention to our complex. Construction of the Berezovskiy open pit mine and the Berezovskaya GRES is lagging. However, the tasks facing the construction workers are enormous: just the first phase of KATEK includes more than 150 enterprises with total worth of about 10 billion rubles, and whose clients are 16 ministries and departments. Concentrated here are 17 general contractor construction organizations of 8 ministries.

To achieve a united technical policy and standardization of volume planning and design solutions for KATEK facilities, the institutes of Minugleprom and Minenergo have developed the "Main Directions for the Structural Design of KATEK Buildings and Structures." However, the long-term and everyday tasks of developing such gigantic complexes often exceed the abilities of territorial management agencies or of a single ministry. I say this because, contrary to the accepted canons of capital construction, there is still no technical-economic foundation for the development of KATEK. The existing documents at specific facilities -- Berezovskaya GRES-1, the Berezovskiy open pit coal mines, and others -- are hopelessly out of date and require serious reworking, revision,

and strengthening at all levels. And it is no accident that the national economic plan does not show the construction and development of KATEK as a single whole. Every ministry here operates on its own.

Moreover, it often happens that the most acute problems that do come within the competence of just one ministry are not solved for years. For example, two

general contractor organizations of Minenergo are working at the Berezovskiy construction site. This leads to dissipation of the investments allotted for the development of the material and technical base of construction, and causes problems in the supply of resources and transportation, and in the wages of workers and ITR [engineer and technical personnel].

Up to now the main role in solving the inter-sector problems of developing KATEK has been played by the coordinating council set up by the CPSU kray committee. This council is presently the only inter-sector agency that is coordinating overall on a regional level the solution of the most urgent economic, social, and technical problems.

The work of putting into service the first generator unit of the No. 1 Berezovskaya GRES is right now at the center of attention of the kray party organization and of all responsible people in the kray. It must be plainly stated that these matters are not being handled in the best way. At the startup complex barely half of the construction and installation work has been done, and about the same is true of housing and civilian construction. There is still a bottleneck in the development of the construction industry, communications facilities, automotive transport, and the production-assembly base.

To speed up matters at the first generator unit Minenergo must solve on a priority basis the problem of the urgent delivery of overhead cranes, while Glavenergostroyprom [Main Administration of Establishments for the Manufacture of Structural Parts and Building Materials of the USSR Ministry of Power Plant Construction], Glavenergokomplekt [Main Administration for Ensuring the Supply for Complete Sets of Power Engineering Equipment of Electric Power Plants, Substations, and Networks], and the Energostalkonstruksiya Trust must place priority orders for fuel delivery to the KATEKenergopromstroy PSMO [industrial building materials organization]. The rate of preparation of the reservoir bed for the startup of the generator unit is cause for concern; it has so far only been half cleared of timber. And to date there has been no decision as to how to exploit the thick deposit of peat underlying the bed.

At the stage of technical design problems were not solved of the raw materials base for the KATEK construction industry, and chiefly of non-metallic raw materials. What do we have to show in construction industry facilities after 10 years of KATEK development? Only a slight growth in precast ferroconcrete at the Nazarovskiy plant for ferroconcrete structures, and the plant for large-panel housing construction that was built in Chernenko. I should note, by the way, that in the two years of its existence this enterprise has developed only 25 percent of its design capacity. Even today the construction industry is experiencing a very acute shortage of crushed stone, sand and gravel mix, and other inert materials.

Meanwhile, Minenergo is in no hurry to start construction of the enrichment plant based at the Vladimirskiy deposit, has strung out the rebuilding of the Nazarovskiy crushing and grading plant, and is slowly developing the Ozhinskiy stone quarry. USSR Minenergo is doing no better at developing the base of the construction industry. In the last five-year plan the KATEKuglestroy Combine did not start up a single facility, and fails year after year to utilize the

investments allotted, permitting a shortfall of more than 30 million rubles to develop here during the five-year plan.

In the last three years there were several positive advances at KATEK to improve the living standard of the people, but they were far from adequate for this region. This is why population movements have been very large here. During the 11th Five-Year Plan for example the KATEKenergopromstroy Association hired 17,500 people, and 11,400 left, while at the KATEKuglestroy Combine the corresponding figures were 8,900 and 6,500.

Under the Berezhovskaya GRES's list of construction jobs 414,000 square meters of living space was constructed and put into service, versus the 645,600 square meters planned. About 40 percent of the kindergarten spaces were provided. One reason for this situation is that under the detail design the number of construction and installation workers at the Berezhovskiy site was not to exceed 8,000, but in fact it has reached 18,000, and the construction and installation organizations plan for it to grow to 25,000. This is 3.2 times more than estimated in the design. It is time to improve the living conditions of the 6,000 families. Still too small is the network of medical facilities, transportation, communications, everyday services, and public catering.

The party kraykom, its gorkoms and raykoms, the party committees of construction organizations, and the KATEK workers' collectives are now applying all their efforts so that the country's most important power construction will pick up the necessary speed in the 12th Five-Year Plan.

Ministry Support for Construction

Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Feb 86 p 6

[Article by S. Sadovskiy, first deputy minister for power and electrification of the USSR: "EKONOMICHESKAYA GAZETA Responds to the Article 'The Fuel-Energy Complex of Eastern Siberia' (No. 1, 1986)"]

[Text] The article correctly laid out the facts and the reasons causing the lag of power construction at KATEK and at the Gusinozerskaya and Kharanogorskaya GRES. The ministry is taking the required steps to carry out the plan tasks for the current year, including expansion of the volume of work to build housing, sociocultural facilities, and the construction industry base.

The article properly raised the questions of speeding up the construction of the Boguchanskaya GES, and of starting work on the construction base of the Yenisey GES and the 1,150 kV Itat-Barnaul power transmission line. This is in

conformity with USSR Minenergo's proposals in the draft plan for the 12th Five-Year Plan.

The Ministry supports the amendments that the article suggests for the text of the draft of the Main Directions for the Development of the Power Industry of Eastern Siberia.

12697

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NON-NUCLEAR POWER

EKIBASTUZ DEVELOPMENT CONTINUES AT HIGH RATE

[Editorial Report] Alma-Ata MADENIYET ZHANE TURMYS in Kazakh No 2, February 1986 carries on pages 4-6 a 1,400-word article by the paper's special reporters Okim Zhaylawov and Myltyobay Yerimbetov, published under the rubric "At the Ekibastuz Fuel-Energy Complex," entitled "A Billion Tons from Vanguard Ekibastuz." The thrust of the article is that development at Ekibastuz is continuing at a rapid rate during the new five year-plan based, above all, upon development of the 5x3.5 km (250-300 m deep) "Bogatyr'" Open Pit Mines. Through new development there and elsewhere in the area a Second Ekibastuz State Rayon Electrical Station is being developed with power to be transmitted through a new 1550 kv Ekibastuz-Ortalyo DC high tension line. Serving the new "Vostochnyy" pits is a recently installed "SRS (k)-2000" excavator system from the GDR. The article provides a history of Ekibastuz development.

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NON-NUCLEAR POWER

UDC 621.311.21:621.221.3

GAUGING STABILITY OF LARGE-SPAN PITS FOR UNDERGROUND GAES

Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 8, Aug 85 pp 72-74

[Article by S.A. Chesnokov, candidate of technical sciences, and V.I. Sheynin, doctor of technical sciences]

[Abstract] The authors have attempted to determine whether it is feasible to sink shafts in strong crystalline rocks where blasting does not affect the rock massif's resistance to water penetration. They present a method that can be used to determine changes in the properties of rock layers around shafts reaching depths of 740-1850 meters. The stability of the rock was determined through laboratory analysis of samples stored for 7 years and then tested for tensile strength, strength under pressure, internal friction, splitting and cracking. The data was processed statistically to determine changes in the properties of the rock layers around large-span pits under various conditions. A computer was used to carry out the calculations according to a program written in ALGOL-60. The formulas used to conduct these calculations are presented and they consider different rock properties and types of strains on the rock layers around the shaft. Variables are introduced to these formulas to show how they affect shaft stability under various conditions. 2 figures. 3 Russian references.

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CSO: 1822/6

PIPELINE CONSTRUCTION

STATUS REPORTS ON USSR OIL, GAS PIPELINE CONSTRUCTION

Yamburg-Yelets-1 Report

Moscow IZVESTIYA in Russian 27 Aug 85 p 2

[Article by B. Lvov, director of the Press-Center of the USSR Ministry of Construction of Petroleum and Gas Industry Enterprises: "Siberian Gas Progresses"]

[Text] The first 2000 kilometers of the Yamburg-Yelets-1 gas pipeline have been laid in the trench.

The lineworkers of the Ministry of Construction of Petroleum and Gas Industry Enterprises have gained a new labor achievement in the ridges of the Ural Mountains. The construction and installation workers have sealed and laid in the trench the 2000th kilometer of the first of six gas pipelines being laid from polar Yamburg to the center and to the west of the country. In this way two-thirds of the new transcontinental artery have been prepared for operation. One more step forward has been made in realizing the heightened socialist commitments adopted by the collectives of the Ministry of Construction of Petroleum and Gas Industry Enterprises in honor of the party's 27th Congress: to build by its opening the linear section of the gas pipeline and four top-priority compressor stations of the Yamburg-Yelets-1 mainline.

The first to cross the boundary of the Yamburg-Yelets-1 gas pipeline were the engineering flows of Heroes of Socialist Labor V. Belyayeva and I. Shaykhutdinov, as well as A. Skokov and A. Rekoshetov. Even though the linemen are working in different climatic zones--some in the Volga regions, some on the ridges of the Kamen strip and some even in the tundra--all of them were caught by nature's caprices. There were hurricane winds, after which snow drifts piled up higher than the cabs of the pipe carriers. There were also real deluges, when torrential rain went on for weeks.

It is not for nothing, however, that they say: skill and work will endure everything. The linemen, turning into road workers, pontoon specialists and field engineers, coped worthily with the matter. Acting as a unified detail, aimed at completing the construction output--a kilometer of ready gas pipeline, the collectives of the engineering flows formed a seemingly continuously moving construction-installation conveyor. By providing a broad combination of

occupations and interchangeability, it linked in precise rhythm the entire industrial process of the construction work. Here is the result: the leading flows daily yielded a kilometer each and over of finished gas pipeline.

Today, when the half-century anniversary of the Stakhanov movement is approaching, on the eve of our construction workers' occupational holiday, every day increases the extent of the ready gas pipeline by 7-8 kilometers. Rates like these are also predetermined by the improvement in the operating mechanism and persistent innovative search of the sector's collectives. In just four and a half years of the 11th Five-Year Plan about 50,000 kilometers of gas and oil pipelines have been put into operation. During this period 281 pump and compressor stations and gas processing plants and almost eight million square meters of housing have been constructed.

The new center of fuel energy in the Tyumen North is finding visible outlines.

Yamburg-Yelets-2 Report

Moscow IZVESTIYA in Russian 15 Nov 85 p 1

[Article by V. Zimon, Yamburg: "A Good Pace Has Been Set"]

[Excerpt] The first 300 kilometers of the new Yamburg-Yelets-2 gas-transport transcontinental artery have been welded into the line. Ahead lie another almost 2900 kilometers from the Polar Region to the Russian Non-Chernozem region. Every month the leading subdivisions of the Ministry of Construction of Petroleum and Gas Industry Enterprises has extended work on the new mainline.

"Look," says D. Nadot, deputy chief of the Main Administration for Pipeline Construction, pointing out a line marked with red pencil. "This line is more complex than we would like. The construction workers of our main administration are faced with forcing ahead on a section for 780 kilometers with 47 rivers, 116 ridges of various size, streams and ravines and with constructing dozens of crossings of motor vehicle roads and railroads."

Each line has its own difficulties. The Yamburg-Yelets-2 also has some. For example, the bottom land of the Moksha River reaches 5 kilometers. This means that the equipment will sink on the very marshy banks. The work must be organized so that heavy line mechanisms will be let through immediately along log roads which have just been laid, while they "hold".

Things are not easy on the new mainline even for such experienced construction workers as the collectives of the 11 production lines of the Main Administration for Pipeline Construction. But natural obstacles do not slow down the forward progress of the mechanized columns. Having set outstanding rates on the preceding Yamburg-Yelets-1 mainline and having completed work on it eight months ahead of schedule, the construction workers could develop on the parallel line almost a third of their planned goal.

Moscow IZVESTIYA in Russian 21 Jan 86 p 2

[Article by G. Alimov: "Accident"]

[Text] Mobile mechanized column No 504 of the Svyaz'stroy-5 Trust and the Bereznikovskoye Administration of Power Supply Systems of Perm Oblast, after long refusals, made good the damages caused by them to the Azot Production Association.

An accident happened on the 146th kilometer of a branch of the Chusovoy-Berezniki-Solikamsk main gas pipeline. The workers of the mobile column, in laying a line of the connection, grazed the gas pipeline with a cable layer's knife and put it out of commission. As a result, 1,700,000 cubic meters of gas were lost. The supply of fuel to the cities of Berezniki and Solikamsk was shut down. Ammonia-producing units, shops for weak and strong nitric acid and other capacities of the Berezniki Azot Association, where gas serves as the main raw material, came to a standstill. The enterprise was inoperative for 12 hours.

The Berezniki City Office of the Public Prosecutor held an inquiry into the facts of the accident. It showed: the main perpetrators of the damage to the gas pipeline were the workers of PMK-504. Partial blame was also attached to the Berezniki Power Supply System Administration by the investigation agencies. It was established that the PMK workers had not studied the plan for the line properly. The construction workers carried out the job without laying out the future line of connection to the site. All the documentation was turned over to be at the disposal of the brigade of construction workers, and the officials got out of monitoring the performance of the work. In other words, there was elementary neglect of the existing regulations and instructions. The basic fault of the power supply system administration lay in the fact that it issued the construction workers poor-quality, obsolete plans, which did not indicate the cable crossing with the gas pipeline....

The RSFSR State Board of Arbitration backed up a suit against the Azot Production Association and adopted a resolution to recover on its behalf from the account of PMK-504 792,825 rubles for damages and 31,713 rubles of gosposhlina and from the account of the Berezniki Power Supply System Administration-- respectively 264,275 rubles and 10,571 rubles. The republic's State Board of Arbitration proposed to the administrations of these organizations that they review the question of compensating for the damage caused and expenditures for gosposhlin at the expense of specific persons. This resolution is based on the assumption of material responsibility of workers and service workers for damage caused to an enterprise, institution and organization.

Yamburg-Yelets Progress Report

Moscow IZVESTIYA in Russian 16 Jul 85 p 1

[Article by B. Lvov: "Stakhanov Acceleration"]

[Text] The first sections of the transcontinental Yamburg-Yelets gas pipeline are starting continuous operation.

They will originate in polar Yamburg--the youngest center of the fuel industry near the shores of the frozen Karsk Sea. The younger brother of the powerful Urengoy, as Yamburg is often called, is gaining strength. The first of six future mainlines extending over 3000 kilometers, directed toward Yelets, is being constructed at increasing rates. About 2000 kilometers have been welded into the line and of them 1560 have been sealed and laid in the trench. At the same time, one of the most complex northern sections of the pipeline in the region of the Priozernaya and Pravokhetinskaya compressor stations have already been turned over for continuous operation.

"In other words," says A. Sazhnev, director of the Severtruboprovodstroy Trust, "almost 250 kilometers of mainline can take gas and begin to operate as a reliable aid to the gas-supply systems already in operation. This means millions and millions of cubic meters of additional gas sent to enterprises, electric power stations and municipal services in the country."

Meanwhile, at the western shoulder of the route, between the Torveyevskaya compressor station and the Tsna River, where the work is being carried out by the collective of the Bryansktruvoprovodstroy Trust, one more section has been prepared to turn over for operation. The regular all-route flyer, carried weekly by radio-telephone, gives the name of the winners in socialist competition. These are the collectives of the industrial forces of Hero of Socialist Labor Valentina Belyayevaya--in Gorkiy Oblast, and Yuriy Listvin in the trans-Urals. Other subdivisions equal them.

"The Yamburg-Yelets transcontinental pipeline constitutes All-Union shock construction work," says G. Sudobin, deputy minister of construction of enterprises for the oil and gas industry. "The unconditional fulfillment of heightened socialist commitments depends on active participation in the 'workers' relay' of many collectives. For example, the Ministry of Construction, the Ministry of Heavy and Transport Machine Building and the Ministry of Industrial Construction should place 130,000 cubic meters of precast reinforced concrete structures, the Ministry of Power and Electrification--a large number of mountings to lay the power transmission lines near the routes and the electrochemical shield lines, and the Ministry of Machine Tool and Tool Building Industry--equipment for the electric contact welding units. It is appropriate to recall that active assistance in the shock construction work is also called for from organizations of the USSR Ministry of Timber, Pulp and Paper and Wood Processing Industry and the State Committee for Forestry which have been entrusted with preparing a 100-kilometer section for laying the gas pipeline in Tyumen Oblast and breaking through hundreds of kilometers in Sverdlovsk and Perm oblasts and in Tatariya, Mordoviya and Chuvashiya.

Khiva-Beyneu Pipeline Report

Tashkent PRAVDA VOSTOKA in Russian 2 Oct 85 p 2

[Article by Yu. Ibragimov, UzTAG correspondent, Khiva, Khorezm Oblast: "Karakum Gas for the Country"]

[Text] The supply of gas from the developing industries of Uzbekistan and Turkmeniya to the central regions of the country and to the Urals has increased by tens of millions of cubic meters. The Khiva-Beyneu main gas pipeline, extending 676 kilometers, has been put into operation. The throughput capacity of the Sredaztransgaz system, where a new underground pipeline is being introduced, has now reached 210 million cubic meters per day.

Welders and operators, mechanics from the pipe-layers and construction workers of the USSR Ministry of Construction of Petroleum and Gas Industry Enterprises fulfilled their commitment with honor: the entire mainline and its compressor stations were accepted ahead of schedule, with a high rating for the work quality. The sand dunes of Karakum and the rocky deserts of Ustyurt, along which the new route lay, were strict examiners. They have been preparing the first and subsequent link-up of the pipelines, which has become the symbol of fraternal labor, for over a thousand days and nights. Workers from Belorussiya and Bashkiriya have worked on the most complex section--the main one. Chelyabinsk and Saratov sent powerful trucks and the railroad workers supplied millions of tons of pipes and other loads.

In many ways the success will be achieved due to the mass-scale use of equipment and precise organization of labor. The mechanized detachments of route workers operated in accordance with brigade contracting, achieving above-plan acceleration at each section of the mainline.

The control panel of the crane group. The first valve is open. The symbolic fiery-red tongue of flame flashes up. Soon the powerful river of gas poured into a new channel. Above the Khiva compressor station, from which the main gas pipeline originates, soars a scarlet sail with the inscription: "Motherland Your Goal Has Been Fulfilled!"

Western Siberian Oilfield Progress

Moscow EKONOMICHESKAYA GAZETA in Russian No 8, Feb 86 p 4

[Article by V. Voznak: "Building Up the Oilfields"]

[Text] The volumes of construction and installation work planned for the organizations of the Ministry of Construction of Petroleum and Gas Industry Enterprises to ensure the development of the petroleum industry in Western Siberia, is this year increasing by 21% as compared with 1985. The number of production capacities and projects and main pipelines put into operation is considerably increasing.

Therefore it is very important to use to the maximum the winter construction season favorable for the oil and gas regions of Western Siberia.

The winter is particularly productive for the construction workers of the main pipeline. Even more stepped-up planned goals are set for them correspondingly in this period. For example, Glavtyumentruvoprovodstroy--the main contracting organization of this specialty--should fulfill in the first quarter an increased plan of construction-installation work--27.5% of the year's assignment. Such planning of the contracting work is characteristic for practically all the contracting organizations in this region, including those from some other regions of the country.

In January the organizations of the Ministry of Construction of Petroleum and Gas Industry Enterprises completed the construction of the first 200 kilometers of interindustrial petroleum pipelines, petroleum collecting systems and gas pipelines and water lines, and created a definite reserve to ensure the introduction of these projects in February and March.

At the same time the work rated on construction of the field and interfield pipelines, which at the middle of January were 15-17 kilometers of pipeline-sealing per day, and achieved by the beginning of February 24-25 kilometers, cannot be regarded as sufficient for a successful resolution of the task set. Additional measures must be taken to accelerate the supply of pipes and their delivery to the routes and to intensify the welding-installation, sealing and earth work in order to reach in February-March pipeline system construction volumes up to 40 kilometers per day.

In January the build-up began of practically all the new petroleum deposits in Tyumen Oblast. Work was particularly stepped-up on constructing the projects of the Rovnikovoye deposit, where comprehensive work was fulfilled to ensure the possibility that the operations workers could start extracting petroleum. Shock work was performed by the collectives of the Shchekingaozstroy, Surgutneftepromstroy and Surgutneftegaz elektromontazh trusts. The build-up rates of the Gun-Yeganskoye and Novomolodezhnoye petroleum deposits were accelerated.

The very first task of the construction organizations and the buyer-enterprises is to complete construction and tests of the oil field projects for the Yershovskoye and Tarasovskoye deposits, which were built up in 1985. Glavtyumenneftegazstroy [The Main Administration for Petroleum and Gas Construction in the Tyumen Region] must intensify work on constructing the units to prepare petroleum at the Talinskoye and Severo-Vareganskoye deposits. For the latter project the Varganneftegaz Association is required to complete, in the shortest time possible, the delivery of the industrial equipment, supporting reinforcement and cable products in short supply.

Unfortunately, so far, for a number of the projects included in the plan for 1986 and already under construction, particularly at new deposits, there is a complete lack of planning estimates. Making out the assignments for the earth-sections and the wood-cutting permits and turning them over to the contracting

organizations is being delayed. The schedules for supplying equipment to the construction sites are being presented with a delay. For these and other reasons, determining the start-up complexes, concluding the contracting agreements without interruption and opening up the financing of the projects under construction have been held back.

Urengoy-Surgut Line Construction Report

Moscow PRAVDA in Russian 12 Dec 85 p 2

[Article by B. Lvov, Tyumen Oblast: "'White Petroleum' of the Ob Region"]

[Text] Yet another line connecting two centers of the oil and gas industry of the Western Siberian region--Urengoy and Surgut--has appeared on the map of main pipelines in Tyumen Oblast.

A large gas-chemical complex for transporting and processing condensate obtained as a by-product with gas at the well-known Urengoye Deposit is gathering strength in the Ob region. These days computers recording the arrival of valuable raw material have registered routine thousands of tons. The delivery of condensate to the processing units increases every 24 hours, close to approaching the planned capacity.

One would not believe now that only a year ago at the northern railroad stations of Yagenetta and Tarko-Sal alongside the fluctuating winter workers cutting through the tundra, the first construction-installation detachments of the Urengoygazstroy, Severtruboprovodstroy and Kholmogortruboprovodstroy trusts and of the Sibkomplektmontazh Association and a number of others were only being put together. An unusual construction project appeared, technically more complex than a gas pipeline. In the first place, the reinforcement of the route was laid at lesser intervals--every 7-10 kilometers. The pipeline itself was laid not on an earthen bed but on wooden beams with an earthen embankment following that. In the second place, the requirements made of the quality of the welding and installation work were particularly rigid.

It was not easy to weld and assemble the equipment in 45-55-degree frosts. It is even more complicated under these conditions to carry out the testing of all the "technology" with the aid of water. But the installation workers, together with workers in related fields, built the gas furnaces and managed to heat up the entire shop, with an area of almost 2000 square meters.

Well, the complex was built and is in operation. Each day through its units pass thousands of tons of "white petroleum", as they often call the condensate. All the new projects are going into operation. Quite recently one more technical unit was prepared for launching in Surgut to produce diesel fuel from condensate--in conjunction with subdivisions of the USSR Ministry of Installation and Special Construction Work.

Tedzhen-Bezmein Progress Report

Ashkhabad TURKMENSKAYA ISKRA in Russian 19 Nov 85 p 2

[Article: "A Gas Mainline Into Construction!"]

[Text] The last section of the almost 300-kilometer Tedzhen-Ashkhabad-Bezmein gas pipeline was turned over for operation. With this the Turkmen capital and its industrial satellite city, on the eve of winter, were converted to guaranteed supply of natural fuel.

Formerly the natural gas of Shatlyk, Mayskiy and other industries arrived at Ashkhabad and Bezmein from deposits in the south of the republic. The throughput capacity of the existing gas pipeline, however, laid almost 20 years ago, was sufficient only to satisfy the demands of these two industrial centers, and the small population points could not hook onto the mainline. Therefore it was resolved to lay a second gas pipeline parallel. As early as in the course of constructing the second line natural gas flowed along the branch pipelines to population centers in the Tedzhen River valley and to the flatland in the Kopet-Dag region. To maintain the optimal gas pressure in the main line, the construction workers of Glavturkmenneftegazstroy installed on it a remote control system for the fuel feed.

Two main gas lines with a reserve ensured the industrial, municipal and everyday needs of the towns. In the future steel arteries from Bezmein will go farther to the west of the republic--to the Rayon centers of Goek-Tepe and Bakharden.

Gasification in Turkmenistan, which holds second place in the country with respect to the volumes of natural fuel extraction, is being carried out in accordance with a long term general plan. Particular attention is paid in it to using the resources from small deposits. In four years of the five-year plan gas was piped along the lines to many cities and settlements in the republic--Bayram-Ali, Murgab, Kaakhka and others. Now 95% of the Turkmenistan population uses natural and compressed fuel.

Yamburg-Yelets Line Progress Report

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Mar 85 p 1

[TASS article, Perm: "Through Forests and Marxhes"]

[Excerpts] The first parts were welded yesterday on the Perm section of the Yamburg-Yelets main gas pipeline. The new line is above-plan for the construction workers of the fuel arteries who have already completed the five-year task with respect to the volume of construction and installation work. The half-year outstripping rate achieved in the construction of all six pipelines, which had originated in the 11th Five-Year Plan at the Urengoy storehouse, made it possible to bring closer the start of laying this mainline.

The Perm section, extending a little over 400 kilometers, is one of the most complex on the route. It is as if it personified the whole future mainline, which will lie through marshes and swamps, forests and mountains. The construction workers are forced to overcome on the Perm Oblast territory about 20 water obstacles alone--rivers and streams. There are large, wilful ones among them, such as the Chusovaya and the Kama.

The line workers took to their associates a wealth of experience in laying fuel arteries, which they had accumulated in the present five-year plan. The work rates increased at each new mainline, and now each industrial flow is capable of laying a kilometer and more a piece of ready pipeline per day.

Methods of laying the mainlines in a so-called single power corridor--a section several tens of kilometers wide--have also made it possible for the line workers to increase constantly the construction rates. This made it possible to concentrate the equipment on the most important sections, to create a good production and repair base and to construct well-appointed settlements for the construction workers. Even the line workers, while laying the fuel arteries not far from each other, knew these places well.

Construction workers from the GDR will build one of the sections extending 50 kilometers.

The Yamburg-Yelets gas pipeline will make possible a considerable improvement in supplying the cities, other population points and large industrial centers in the European part of the country with natural fuel and valuable raw material.

Kursk-Kiev Pipeline Report

Moscow PRAVDA in Russian 28 Oct 85 p 1

[Article by V. Levin, UkSSR: "A First Crossing"]

[Text] At the end of the 55th day, the "ZIZ-200-Evrika" moored at its berth. The crew saluted the victory with all its position lights. The new vessel, designed to lay trenches at the bottom of small rivers under the siphons of oil and gas lines, underwent a complicated experiment. Behind them was the first crossing through the Dnepr tributary Sula on the Kursk-Kiev gas pipeline.

This vessel is far from ordinary. It belongs to the Specialized Administration for Underwater-Technical Work No 11 of the Soyuzpodvodtruboprovodstroy Association. The "ZIZ-200-Evrika" stands for: the hydraulic dredge of the Isayev-Zolotovskiy structure with an estimated productivity of 200 cubic meters an hour. Nikolay Isayev is its commander and Yuriy Zolotovskiy is the chief engineer of the administration. Constructing the vessel along with them were Anatoliy Beresnev, machine operator, who proved to be a highly skilled lathe hand, the brother of the chief engineer--Vladimir Zolotovskiy, special-skill ships mechanic, and Leonid Khoroshun, master welder.

"They worked on the hydraulic dredge in their free time," says Nikolay Isayev. "In six months they lowered it into the water. They were able to get along so quickly due to the support of colleagues from the administration."

"Working on small rivers," adds Yuriy Zolotovskiy, "is relatively unproductive from two to up to four months, and entails frequent equipment moving. Hauling it by water either takes too long or is in general impossible. The overland variant remains. But it takes about a month merely to dismantle and assemble a standard hydraulic dredge. And our design, due to a modular arrangement makes it possible to dismantle the vessel in a calculated number of hours and deliver it to the next crossing."

The creators of the hydraulic dredge realize: the vessel can be considerably better in plant manufacture. Incidentally, the designers emphasize the fact, and have thus begun to do it, that the enterprises putting out similar equipment frequently lag behind the needs of the construction-underwater workers. The "ZIZ-200-Evrika" is already the second and considerably improved hydraulic dredge assembled by enthusiasts. The first one was constructed six years ago according to drafts of this same Isayev, and successfully ensured gas pipeline crossings over the Khoper, Sosnu, Don and Seym.

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CSO: 1822/237

PIPELINE CONSTRUCTION

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PIPELINE RELIABILITY IN WEST SIBERIA STUDIED

Moscow STROITELSTVO TRUBOPROVODOV in Russian No 1, Jan 86 pp 12-14

[Article by Ya. M. Kagan, All-Union Planning Association of the Scientific Research Institute of Petroleum, and S. M. Sokolov, State Planning and Design Institute for Oil and Gas in the Tyumen Region: "Ways of Increasing the Reliability of Industrial Pipelines at Oil Deposits in Western Siberia"]

[Text] The problems of ensuring the reliability of industrial pipeline systems should be solved at all stages, planning, construction and operation. A poor quality of fulfilling the work at any of these stages will lead to a reduction in the level of pipeline reliability and can be shown as the cause of an accident.

An analysis of the causes of accidents in petroleum-gathering systems showed that basic among them are corrosion damages to the inner surface of the pipelines, deviating from the plan in the construction period, mechanical damages to the pipes when the construction-installation work is carried out, and plant reject of the pipes.

Corrosion damages to pipelines stem from the corrosiveness of well products, caused by a large content of mineralized water with dissolved corrosive-active elements--carbon dioxide, hydrogen sulfide, hydrogen-sulfide-reducing bacteria etc. Local damages can stem from layer separation of well products: water separation, its accumulation and settling of slag and corrosion products in the lower sections of the pipelines.

Effective means of combating interior corrosion are the use of inhibitors, using pipes with an inner coating and organizing repair services for constant inspection, preventive maintenance and repair of industrial pipelines.

In the initial period of developing petroleum deposits in Western Siberia, the orientation was toward seasonal construction of industrial pipelines, mainly in winter. Solutions were incorporated in the plans to increase the strength and stability of the pipeline. These consist of various types of underground padding: with maximal use of the supporting capacity of turf, on floating and pile mountings; in the form of a slack filament using the supporting capacity of the pipeline itself; ground padding with a banking of local soil; ballasting and securing the pipelines with weights and anchors. During the construction,

however, in a number of cases deviations from the stipulated plan for the work process were permitted: the breaks between operations were not observed, the required preparation of the lines, sufficient ballasting, etc. were not ensured.

In the process of construction the need appeared to improve both the method of laying the industrial pipelines and of securing them, so that the reliability of the pipelines with the decisions adopted would be ensured under the conditions of a high rate of production work, given the presently existing machines and mechanisms.

An important problem under the conditions of the region in question is assuring the stability of the pipelines at planned levels. Solving this problem at the industrial pipelines to transport a three-phase flow (oil, water, gas) is particularly complicated.

The main reasons for pipelines rising to the surface are: insufficient stability of the weights on weak soils, reducing the number of them as against the plan, failure to adhere to the technology of the unit; the appearance of water in the trench in the process of construction, etc.

A lack of the ballasting specified by the plan and laying pipelines through marshy lakes without working out the water lines create additional stress in the metal of the pipe, which with diminished thickness of the pipe wall as a result of corrosion lead to damage.

Various structures of weights and anchors to secure pipelines at the planned levels have recently been developed: weights with increased stability--belt, encompassing wedge-type; anchors--boom, driven hinged, explosive; ballasting using nonwoven synthetic materials.

The reliability of these methods in the cycle of experimental construction is quite high, but in mass production the efficiency of their use is reduced due to an insufficiently high quality of execution.

With overland laying of pipelines, the banking in most cases breaks with time. This occurs due to the poor quality of its completion in winter, failure to adhere to the given parameters of the slopes, complexity of the sprinkling of the turf with mineral earth, etc. There are no reliable methods to secure the banking against erosion and weathering.

Destruction of the banking leads to a loss of stability for the pipelines on both the vertical and horizontal planes. The negligible depth of the pipelines and laying them without banking are among the reasons for their mechanical damages.

Experience has shown that the basic method of laying the industrial pipeline systems, ensuring the required level of reliability, should be the surface method. In some cases, when the routes of existing pipelines intersect and on sections that are fairly complex in the hydrogeological respect, overland laying may be stipulated. Introducing construction quality control systems

and intensifying technical supervision on the part of the buyer and authorial supervision will contribute to increasing the reliability of industrial pipelines.

A qualitatively new view of the problems of designing and constructing industrial pipelines is now required. Increasing the work volumes and raising their quality are possible only with a transition from seasonal to year-round construction. We will implement this transition in the near future when using traditional methods and series produced mechanisms, including marsh-crossing equipment.

Creating power-driven systems designed as a unit will make possible a transition to a new stage of development in year-round construction using advanced technical designs.

For the first stage, the State Institute for Oil and Gas in the Tyumen Region has completed developments which increased reliability and make it possible to carry out year-round construction on complex sections (marshes types I, II, III and on lakes), ensuring passage along the routes in the operational period to service the pipelines.

The classification of locality with respect to complexity and basic technical solutions for laying pipelines are given in tables 1 and 2.

Table 1. Classification of Complex Sections

Section Type	Characteristics of Section	Characteristics of Soil	
		Supporting Capacity in MPa	Maximum Resistance to Shift, in MPa
1.	Mineral soils with high level of ground waters	<0.05	
2.	Marsh type I, depth <0.5 m	0.02 - 0.03	>0.01
3.	Marsh type I, depth ≥0.5 m	0.02 - 0.03	>0.01
4.	Marsh type II, depth <0.5 m	0.01 - 0.02	0.01 - 0.005
5.	Marsh type II, depth ≥0.5 m	0.01 - 0.02	0.01 - 0.005
6.	Marsh type III, depth <1.5 m	0.01	<0.005
7.	Marsh type III, depth ≥1.5 m	0.01	<0.005
8.	Lakes, width <30 m	-	-
9.	Lakes, width ≥30 m, depth <1.5 m	-	-
10.	Lakes, width ≥30 m, depth ≥1.5 m	-	-

The greatest difficulty in the construction of industrial pipelines is presented by sections of the routes type III marshes and lakes, where, according to CNiP [Construction Norms and Regulations] 111-42-80 only the work of special equipment using pontoons or ordinary equipment with floating devices is possible. However neither of these methods can fully ensure the laying of industrial pipelines.

Table 2. Technical Solutions to Prepare Strips of the Passage, and the Methods and Means of Developing the Trenches and Laying in the Pipeline Depending on the Construction Period

Section Type	Construction Period	
	Winter	Summer
1.	Traditional methods.	On the basis of the materials of the engineering-construction searches specify the building of a log road or use of marsh-crossing equipment.
2.	Traditional methods.	Same as for the section of type 1.
3.	Preliminary freezing of the passage strip (100%). Using a single-shovel excavator. Laying pipeline from the edge of the trench using the combined method.	Building a log road (100%). Using a single-shovel excavator on the platform of a marsh-crossing tractor or on log paving. Laying pipeline from the edge of the trench using the combined method.
4.	Preliminary freezing of the passage strip (100%). Using a single-shovel excavator. Laying pipeline from the edge of the trench using the combined method.	Passage with the aid of marsh-crossing equipment without building roads. Using a single-shovel excavator on the platform of a marsh-crossing tractor or on foam sledges. Laying pipeline from the edge of the trench using the separate method.
5.	Preliminary freezing of the passage strip or building a log road. Using a single-shovel excavator on the log paving or foam sledges. Laying pipeline from the edge of the trench using the combined method.	Building a log road (100%). Using a single-shovel excavator on foam sledges or on log roads. Laying the pipeline from the edge of the trench using the separate method.
6.	Freezing the passage strip or building a log road. Using a single-shovel excavator with grips from a crack in the ice. Laying a pipeline from the edge of the trench using the combined method	Building an embankment made from soil. Using a single-shovel excavator.

[Table continued on following page]

[Table 2 continued]

Section Type	Construction Period	
	Winter	Summer
7.	Building an embankment made of soil. Using a single-shovel excavator. Laying the pipeline in the embankment using the separate method.	Laying the pipeline in the embankment using the separate method.
8.	Filling the waterline sections. Using the drag-line dredge. Laying with a drag-through.	
9.	Depth 0.5 - 1.0 M: Breaking up the ice and filling the embankment. Using a single-shovel excavator. Laying the pipeline in the trench using the combined method. Depth 1 - 1.5 M: Building an ice fording with reinforced brushwood corduroy road. Using a single-shovel excavator. Laying a crossing through the ice in the line section with subsequent immersion.	Building a soil embankment. Using a single-shovel excavator. Laying the pipeline in the embankment using the separate method.

It is expedient to use on these sections industrial embankments which are laid in the period preceding the construction, or in the construction period. The embankments may be constructed from soil that is brought in or hydraulic filling. Laying industrial pipelines in industrial embankments makes it possible to: carry out year-round construction and servicing; raise the quality of the construction and installation work; ensure construction continuity using highly productive series equipment; increase the reliability of pipelines on complex sections. The industrial embankments in this case are a structural element of the pipeline.

Possible systems of carrying out work using an industrial embankment when one or several pipelines are laid are shown in figure 1.

Among the disadvantages of laying pipelines in the bed of industrial embankments are: an increase in the volumes of earth work, the need to increase the number of dump trucks, excavators and hydraulic dredges and the need to search for additional dirt quarries and develop them.

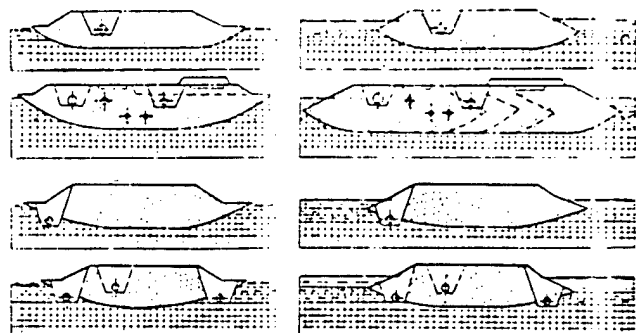


Fig. 1. Structural diagrams of industrial embankments.

I--at marshes of the third type; II--at lakes.

- 1--a single pipeline is laid in the bed of the embankment;
 2--several pipelines with combined passage are laid in the bed of the embankment; 3--the pipeline is laid in the sloping part of the embankment; 4--pipelines are laid in the sloping portion and in the bed of the embankment.

Two-year planning of the work is efficient when industrial embankments are used. They make it possible to carry out the construction of the embankments and roads at a favorable time of year. Constructing the embankments only in the main passages and laying industrial pipelines in winter on connections to the basic lines with traditional methods makes it possible to reduce the volumes of earth work when the deposit is built up as a whole.

Also contributing to a reduction in the volumes of earth use is combining the passages being built for the communications lines with intraindustrial motor vehicle roads when placing the pipelines in a sloping part of an earthen bed (figure 2).

Using hydraulic filling makes it possible without particular difficulties to place the pipelines in the sloping part in adherence to the normative requirements. When soil that is brought in is used to reduce the volume of earth work it is expedient to alter the existing norms so as to reduce the permissible distances between the pipelines as well as between the pipeline and the vehicle road.

Using the sloping part of vehicle roads to place pipelines was specified in plans for building up the lake section of the Samotlorskoye and Fedorovskoye deposits. In the process of building up the Kholmogorskoye deposit, the industrial pipelines were also combined with the motor vehicle roads. Experience in the construction and operation of the pipelines showed the efficiency of this method of laying them.

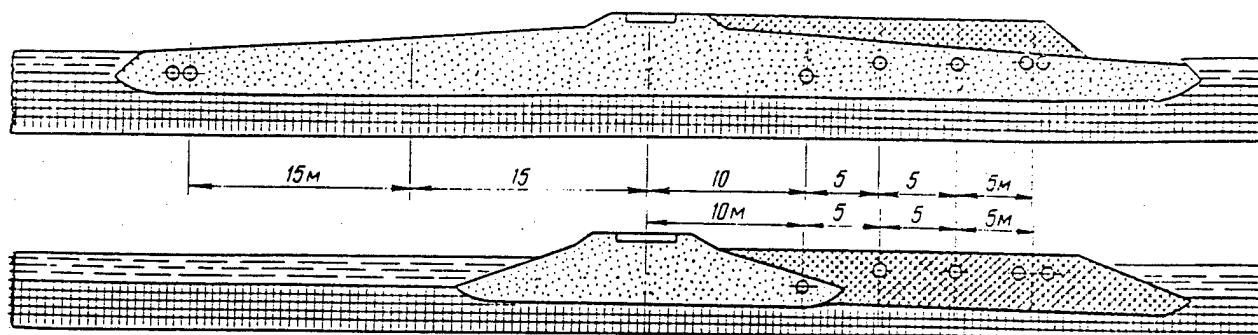


Fig. 2. Diagrams of the combined laying of industrial pipelines with a motor vehicle road:

- a--with the construction of an earthen road bed through filling;
- b--with the construction of an earthen road bed made from soil that has been brought in.

At the present time the repair of broken sections of pipeline in marshes of type III and lakes is carried out by the method of a washout with the aid of hydraulic dredges. After the washout the pipelines occupy a position analogous to laying in an embankment which considerably improves the conditions for their operation.

High-quality planning and construction of industrial pipelines necessitates extremely rapid confirmation of the norms for their planning and construction.

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ENERGY CONSERVATION

ACADEMICIAN DEMIRCHYAN ON ENERGY CONSERVATION TASKS, POTENTIAL

Moscow LITERATURNAYA GAZETA in Russian 26 Mar 86 p 10

[Interview with Academician Kamo Seropovich Demirchyan, USSR Academy of Sciences, by V. Yankulin: "Energy Conservation--In Quantity and In Essence"]

[Excerpts] [Question] "Satisfy the country's growing demands for fuel and energy mainly by conserving fuel-energy resources..." is part of the Basic Directions of USSR Economic and Social Development for 1986-1990 and for the Period Until the Year 2000. Kamo Seropovich, before starting our conversation on energy and energy-resource conservation, could you explain why, from your point of view, has this problem become so urgent in this country (it arose even earlier in many developed countries) when so much oil, coal and gas is being produced; when many electric power plants are being built and when ever more electricity is being generated?

[Answer] If you look at the problem historically, then it becomes clear that it did not happen suddenly. Certain energy-shortfall trends were noted back in the fifties; they became very distinct by the seventies. Now, these trends have become the most urgent, critical problem.

In the late 1970's and early 1980's, about 9 billion tons of energy resources (calculated in standard-fuel units) were produced. This means about 2 tons per year per person worldwide. This is the average consumption figure, assuming that all inhabitants of the earth receive the same amount, distributed equally to the underdeveloped tribes of Africa and to the millionaires in the USA. However, if we differentiate the indicators by country, then we see that an American consumes about 11 tons of standard fuel each year, while the resident of an African country, only 200 kg. In other words, one person daily consumes 55 times more energy than another!

Energy consumption is not just to provide residential heating (only 10 percent of fuel resources are used for this), but also for air conditioning, without which it would be difficult to exist in hot climates; for food preparation and for production of goods and foods. Finally, it is used for production in general, which provides benefits for modern civilization and work which makes it possible to enjoy these benefits. Today, energy determines the comfort level and the level of infrastructure development in the cities and villages in which we live. In short, energy is an indicator of modern man's standard of living.

Thirty years ago, the main hopes rested on coal. Oil and gas were used to a small degree in the present sense, and estimates of these reserves were very small. Ten years later, during the sixties, the oil era began. Its signs were the discovery of new fields and the large, ever-increasing growth of production. The growth of consumption was just as large, because it involved different forms of consumption, because of petrochemistry. There was no sense of the price which had to be paid for this luxury: oil was sold for 2-3 dollars a barrel (about 12 dollars a ton) on world markets.

Those who understood the situation knew even then that the rapidly developing processes, based on cheap energy, would only be stable while energy remained cheap. The events involving the overthrow of the Mosaddegh government in Iran demonstrated how dangerous were the forces hidden in the threat to limit supplies of cheap oil to industrially developed countries. I would say that energy was always part of the decorations on the stage on which political and military passions were fought out in the Middle East. And, according to the feedback principle, politics alone was the actual cause of the first energy crisis in 1973.

At that time, serious research on natural resources began, involving the search for more efficient and economical technical systems using energy in the form of fuel. It came to be understood that consumption of energy resources had to be cut, and that the dependence on nature had to be reduced. Naturally, this had to be done without sacrificing living standards or reducing productive capacity. The ideal, the criterion or the goal, if you wish, was to convert to a level of energy consumption which, being minimal, would provide modern man with everything necessary, within sensible limits.

[Question] Obviously, the time had come to reduce energy consumption. But the formula "to satisfy INCREASING demands by CONSERVATION" is being preached today above all as the formula for direct conservation of electricity in daily life. Doesn't it seem to you that in reality, energy consumption has increased sharply: many families have two televisions. Many apartments have microwave ovens and other electrical appliances in addition to electric stoves.

[Answer] I don't think so. All the benefits we have obtained in the last 10 to 15 years have raised electricity consumption by only 2-3 percent. Therefore, along with an increase in the quantity of electrical appliances, their quality and technical characteristics have also improved technical characteristics. Vacuum-tube televisions have been replaced by solid-state ones. The electrical motors in vacuum cleaners, food processors and washing machines have been improved. Of course, there are many reserves here, about which much has been written and said, and which I will discuss later. But think of this: 70 percent of all the electricity generated is consumed by industry. We will hardly solve the problem of conserving fuel resources in the country by reducing everyday consumer use of electricity. In addition, I am certain that the more we electrify our daily lives, by introducing newer and newer electrical appliances, the easier it will be to save electricity. Electricity expenditures will be easy to monitor, and

this is very important for conservation: to have an objective indicator. Even during the energy crisis in the West, there were no shifts in technology for domestic lighting or electricity consumption. What was actually done? The efficiency of electricity use was sharply increased, rooms were made more comfortable by various means and systems of sealing, which were developed very quickly... I should note that many countries which lived through the energy crisis use electric heating.

Consider the ideal residential building. It has one energy inlet: an electrical one. There are no gas stoves or even central-heating radiators. It's clean and warm. The apartment is heated by flat electrical plates, which are already available here; these plates are installed in the walls behind the wallpaper. These systems are easy to regulate, even automatically. If the set temperature in an apartment is 18 degrees, then it will be 18 degrees, not just near the radiator, but evenly throughout the apartment. The problem of electric heating of housing can be solved only with a closed ventilation system, which eliminates the necessity of getting rid of excess heat. There are already many interesting designs for such systems.

What is happening in our homes today? In winter and especially in spring--your newspaper has written about this--buildings located near TETs's obtain the hottest water. They're basically overheated. People can't sleep, they open windows, take sleeping medicine... Too much heat causes no less discomfort than too little heat. Buildings far from heat-and-power plants are chronically underheated; these people also experience discomfort, but of an opposite nature. Large capital expenditures will be necessary to provide even heat distribution through the existing centralized heat-supply system. Besides the many boiler plants that perform the function of auxiliary "pump houses," what is needed are large quantities of measurement and regulating devices which are simply not now being produced. The building with a single electrical inlet could be the best solution to the energy-supply problem if only... If only we produced a sufficient supply of electricity.

[Question] This is a vicious circle: fuel-energy resources can be greatly conserved by more widely using electricity, which is being insufficiently generated, again due to a shortfall of these same resources. Could it be that we need to start with small-scale measures, with the problem widely discussed in the press, including our newspaper, of equipping building entrances with relays which would turn on the lights when a person entered the building and would turn them off as soon as that person stepped into the apartment?

[Answer] Of course, all light bulbs could be replaced with fluorescent and luminescent light sources; televisions can be made with the latest digital devices; microprocessors can be put in refrigerators, washing machines and stoves. If we implement the latest achievements of scientific-technical progress, we will achieve, for various technical reasons which we will not discuss here, at best a five-percent savings of domestic electricity consumption. And I'm not even sure of this modest figure.

The problem of domestic energy conservation can be principally solved in one of two ways. The first is to institute very strict, Draconian economic sanctions with accurate recording of all consumption of water, heat, electricity and gas. This will require enormous financial expenditures, materials and productive capacity to develop means of monitoring; it will also require that a large number of people enter these sectors. The second path is to let microprocessors do the work of energy conservation. This would force us to conserve despite our personal wishes and would rationalize our daily lives. These devices would relieve us of the minor details of conservation, by performing them automatically.

Energy conservation is not achieved by us having a minimum of light bulbs in our apartments, but by us making sure that only necessary ones are on. This is where microprocessor equipment could be useful. This equipment, which has been developed, is being produced and in general is not considered exotic. When you sit down far from a window and decide to read, the microprocessor turns on the wall light. It can store information about your eyesight, or more exactly, about the illumination you need for working and reading. Such systems have been widely implemented abroad. We are now talking a lot about personal computers, but we forget how useful they can be in daily life as regulators of electricity consumption.

So if we optimize energy consumption, then this is the way we will do it, on this level. By the way, the organization of our workplace is little different from the organization of our home life. At the workplace too, light bulbs must be lit when they are needed and electric motors must be on only when they are doing useful work.

Undoubtedly, we must use all the ideas and achievements of modern science and engineering. Say that we have calculated that a conversion to fluorescent lights with electronic starters would conserve 15 billion kilowatt-hours of electricity per year. But, we must look at conservation in a broader sense. In order to produce these lights, completely new production facilities must be organized. This production must satisfy all consumers. The transition must be complete, or else there will be unavoidable losses in project designs, component parts, service etc. Large expenditures would be needed for such a transition. Overall, when we talk about energy conservation, we can't look only at a particular localized link of the energy chain, but we must consider it as a whole. If a certain energy-conserving measure requires the organization of new, complex production facilities while providing savings (even of fifty percent!) only in a tiny section of energy consumption, then it would be senseless from an economic point of view. Totaling the expenditures, we find that no real savings have been realized. We must ask: do we need this idea just for its own sake?

Let's return to the beginning of our conversation about the general principles of the efficient use of primary fuel. The multitude of problems arising here must be considered not separately, but as a whole, taking into account the variety of conditions in the country. We must determine the hierarchy of these problems: their importance from an economic point of view, the possibility of solving each of them at the present level of science and industry and, finally, the order in which they must be solved.

I think that the first thing we must achieve is a reduction in the consumption of primary heat carriers in production and transport. Today, this is the general direction of changes in engineering, technology and even human psychology.

[Question] However, Kamo Seropovich, each specific measure to conserve electricity, heat or motor fuel is linked with the direct consumer. Sixty percent of all the electricity in the national economy is consumed by electric motors. Naturally, the following question arises: in order to conserve energy, can the mechanical worker be perfected? Mechanisms now perform the lion's share of physical labor on this planet.

[Answer] The asynchronous electric motor, invented by the Russian inventor M. O. Dolivo-Dobrovolskiy at the beginning of the century, today serves as the main source of motion. The motor has been improved over nearly 100 years and has now been sufficiently perfected. However, the problem of energy conservation is determined here not so much by the electric motors themselves, but by the technology into which they are built.

Speaking about electricity conservation in daily life, we have established that the main thing is the necessity of correctly organizing heat exchange in our residences. If we started with the obvious--that to conserve means to burn less (now, by the way, several leaders have imposed such obligations in conjunction with the energy-conservation campaign)--then it would lead to a situation where if it was too cold, people would turn on their electric and gas stoves, get additional electric heaters, fill their baths with hot water and so on. In this case, the consumption of energy resources, naturally, would increase.

All of the design successes for motor efficiency aren't worth anything if the motors aren't economical to use. More metal can be used in a motor, and this will result in a decrease in the in-plant energy consumption. But if the motor isn't continually loaded, the achieved energy savings will not pay back the development expenditures. Therefore, when posing the question of developing a motor which uses electricity more efficiently, we must answer other questions: what is the motor's per-shift load and what will the motor's operating conditions be?

The efficiency of any energy-consuming system depends on its use. The material resources put into it must be paid back within an acceptable time. Economics is directly linked here with the usage time of electric motors. Unfortunately, the load coefficient of these systems is low: they are either idle and not performing their functions (for various reasons: malfunction, lack of spare parts, ignorance of how to use the motors or simply negligence) or they operate inefficiently (we install a large motor, and use only a small part of its capacity). This technological mismatch between goals and means represents a large loss in our energy expenditures.

[Question] Does this mean that the main miscalculation is not in the design of new machinery, but in improper use?

[Answer] Consider for yourself: would it be advantageous today for the manager of a large production facility to conserve electricity? No, it's

not advantageous. If you do this, under the existing system of energy allocation from state resources, then you'll receive a lower limit the next year.

An enterprise receives electricity limits depending on its installed electrical-equipment capacity. Therefore, the manager selects higher-capacity equipment for his production facility, in order to later rightfully demand higher electricity limits for it.

The existing practice of allocating resources distorts the structure of organizational measures (stimulating greater consumption than necessary). This distortion is mirrored in each production section. If the enterprise management is not interested in something (in this case, energy conservation), lower management links will not be either. The enterprise manager is not troubled by the fact that when 1 electric motor is operating, 20 are idle. Imagine how much energy would be conserved (and not only energy, but also scarce electrical equipment, valuable materials and labor---everything which is consumed to produce electric motors) if all 20 motors were operating, rather than idle!

However, we can understand enterprise managers. Suppose that a new, improved technology is installed. The technology operates beautifully, electricity consumption is reduced, labor productivity is increased etc. Next year, the same amount of electricity is allocated (in the best case!) to the enterprise for this process line. However, the equipment is beginning to age, and its characteristics have deteriorated. Since this is never taken into account in plans, there is nothing with which to cover the production overexpenses. Therefore, the manager is forced to create internal reserves at his own discretion.

I'm not saying anything new, but am basing this on what has long been known; however, for some reason nothing has been done in this regard. It will be impossible to defeat the conservatism of production workers who follow the principle "what will be, will be" without overcoming the conservatism of planners and higher-level managers. I don't know how convincing my conclusion in favor of general economic measures for energy conservation will sound, but since 1973, when the energy crisis started in the developed capitalist countries, the actual consumption of electricity per unit of production has been reduced there by 20-40 percent. We haven't yet achieved this. Just think what a huge reserve for conservation it would be to conserve a third of all the energy consumed in the most energy-intensive sector of the national economy!

[Question] Thus, the main lever of energy conservation is economic. What specifically do you propose to change in the economic mechanism of energy and electricity consumption?

[Answer] Here's an example that will clarify a lot of things. A new series of instruments was developed at one of our electronics enterprises. The consumer for which the series was designed asks the designer: what are the rated norm-hours of electricity consumption for the instruments? The designer names the calculated figure and admits that in actuality it is greatly exaggerated and that it can be greatly reduced. But this doesn't

satisfy the consumer. But, if it could be shown that the device will consume more energy, on the basis of new capabilities and higher productivity... Let the actual consumption be lower, the important thing is that the specification shows a greater consumption; then the new device can receive higher limits. This is an excerpt from an actual conversation about the implementation of new equipment.

While serving in various commissions, I had to investigate the efficiency of electricity consumption at many plants. From many hours of conversations with directors, engineers and process engineers, I came to the firm conclusion: no one will take serious conservation measures while energy resources are allocated. Where reduced energy consumption has been proposed, you can be certain that in another section of the enterprise, there is an unnoticed increase in the planned energy consumption. No self-respecting manager would want to live today without an energy reserve.

The development of a serious energy-conservation policy must begin with the elimination of the practice of allocating energy resources and energy from state resources. Otherwise, there will be much talk about conservation, but no conservation will result. The economic mechanism must work so that people who conserve will not end up in an unfavorable position. We are counting on the conscientiousness of our people, and, by the way, not in vain. Everyone understands and everyone grieves, but the plan must be fulfilled. This requires first of all that all people live within their means. Therefore, of course, it must be advantageous for people to conserve resources and energy.

I always try to show by these conclusions the direct dependence of electricity-consumption measures on general-economic measures and on the economic basis of production organization. I am sure that energy conservation in this country, particularly electricity conservation, must begin with the solution to the key problem of changing the economic bases of consumption organization.

[Question] The quality of production, probably, has the most direct relation to energy supply, material supply and, in the final analysis, to the labor and working-time content. A broken television must be taken in a taxi (consuming gasoline) to a special repair service, which also consumes no small amount of electricity and which requires a continuous supply of spare parts and so on. Aren't there any hidden reserves here? How can energy losses be reduced through quality?

[Answer] The essence of this problem, the separation between the producer and the consumer, was indicated at the 27th CPSU Congress. The workers in a sector are separated from those who use their products. One sector is responsible for production and receives all its benefits depending on how much is produced. A second sector (Gossnab agencies) are responsible for distributing production goods by regions. A third sector (retailing) is responsible for direct sales to the consumer. A fourth sector (services) is responsible for utilization. All these sectors have practically no mutual links.

Let's say that a certain device, such as a computer, is developed. It consists of printed circuit boards, which in turn consist of individual elements. It is very simple and inexpensive to check the quality of these elements using automatic equipment or a special test stand. The expenditures for circuit-board inspection are 10 times higher. If the finished device does not work, then the expenditures increase a 100-fold just to determine the causes--under production conditions at that. When the device reaches the consumer, then the expenditures to find and correct a problem are another order of magnitude greater: in other words, a 1000-fold greater. This is because repair workshops don't have what the production facilities have: the proper instruments for inspection, spare parts or specialists thoroughly familiar with the system and design. Thus, the economics of quality give us with statistical confidence a 1000-fold increase in the expenditures per unit of faulty finished product. I think it is clear that everything that we lose in quality has its equivalent in energy expended to produce the faulty product.

[Question] In sum, we have gone from the problem of energy conservation to the problem of quality, which today is of primary interest. What measures, from your point of view, would greatly improve product quality and provide energy conservation?

[Answer] The problem is complex, and, truthfully speaking, not exactly addressed to the right person. But I will try to give my understanding of the problem. I think that it's time to make quality of paramount importance. The time has come to do away with bulk indicators and the plan in the sense that it has been understood for many years. Experience confirms that one can't operate in economics with absolute indicators. If we mindlessly begin with energy conservation, we can in general achieve any progress in equipment replacement in sectors, and the party today is calling for this equipment replacement.

Along with the volume of production, we must plan, for example, a permissible quantity of advertising. (This, of course, should be minimal.) Cost indicators of profit obtained by the plant from product sales can also become a quantitative measure of performance.

Unfortunately, the sector nature of production organization in fact monopolizes the output of products, depriving the consumer of freedom of choice. The entrenchment of this situation through plan allocation of resources completely blocks the cost-accounting mechanism, and it ceases to stimulate a reduction in product unit cost. Now, an enterprise's profit and all the worker income are a percentage of the product cost. It's simpler for an enterprise to raise the product price than to make the same profit by improving the product quality while reducing the price. The worst thing is that the buyer of manufactured products, for these same reasons, is not interested in a price reduction. Of course, we're talking here about other enterprises as buyers. Thus, allocation from state resources, "working" together with the monopolistic right to produce a given product, creates anti-cost-accounting incentives both against quality improvement (the product must be taken because there are no substitutes) and against price reduction (neither the manufacturer nor the purchaser are interested in this).

The practice of allocating deliveries from state resources, together with insufficient quality and missed deadlines, makes sectors engage in self protection, leads to many parallel developments and to the production of "one's own" items. In the power industry, this policy leads to the creation of many small boiler plants for the production of steam and thermal energy in cities.

In order to eliminate monopolism, several ministries should have the right to produce the same product, on request from and financed by a customer. It should be the sector's prerogative to develop a certain type of production. If it turns out that several sectors are interested in manufacturing a given product, then competition will develop, which will promote better quality and reduced prices of the items. The main criterion for successful management activity of these sectors must be the quantity of high-quality satisfied orders, with financing, in turn, based on that.

If we permit the production of similar products in various sectors, then, in my opinion, the difficult current problem of regional industrial scattering will be solved: the enterprises in a certain region must be transferred to the authority of one ministry. Then, the development of a territorial-economic complex will be basically provided in the framework of one or two ministries. This mechanism would combine the advantages of centralized sector management with the positive aspects of regional management, along the lines of the sovnarkhozes.

[Question] One of the zealous conservation measures was the introduction of daylight savings time. Three billion kilowatt-hours of electricity per year were conserved. Couldn't other kinds of measures be introduced: say, dividing the summer day into two parts, with a break at the hottest part of the day, when it's most difficult to work?

[Answer] The introduction of daylight savings time provided additional conveniences and psychological benefits: it's better to go to work or school when it's light outside. As far as dividing the workday into two parts, this would be feasible only in the country's southern regions.

I would like to emphasize one point. In the first years of Soviet authority, the financial year was changed to end in June. Economists and production workers today consider this arrangement more convenient for planning, finalizing totals and organizing material-technical supply. No one is disputing this opinion. But the transition to the new time frame, with a half-year shift, of all plans, all documentation, all report forms and all the related management mechanisms will cause a one-time loss of several billion rubles. No one, obviously, wants to take responsibility for such a large sum of "losses." But this is a one-time loss, and in the future there will be annual savings of enormous proportions, and a normal production situation, without rush work. There will be a specific time for comparing requests for material supply etc.

Today, the financial year ends in December, the most difficult month, in terms both of weather and energy consumption at all enterprises trying

to make up for lost time during the year. January is also a winter month, but it is a "holiday" season for plan load compared with December. Therefore, the most unproductive months of the year are January and February, despite the fact that the overwhelming majority of people are working. If the year's end were transferred to June, then the most unproductive months would be July and August. But they will become more productive because of summer vacations and because repair work can be done in summer, production facilities can be renewed, roofs can be opened and earthwork can be quickly done.

The combination of economic factors with natural ones and with human biology is also extraordinarily advantageous for the population and for production, as well as for the government overall. Why is this being disregarded? The problems are inertia and the fear of restructuring, which, as with any innovation, require an active position and a fairly large amount of work.

[Question] How do you see energy supply in the year 2000? We are all today looking toward this arbitrary, though important, landmark in human history.

[Answer] The USSR Energy Program provides for an active energy-conservation policy and for a reduction in the specific energy intensity of the national product. According to proposals, this indicator will be decreased by 12-17 percent by the start of the new century. However, I think that this amount of conservation can be at least doubled, if the economic and organizational mechanism of energy-resource use, about which we have spoken in sufficient detail, is changed.

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ENERGY CONSERVATION

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USSR NATURAL GAS SUPPLY INSTITUTE OFFICIAL ON NEW TASKS

Moscow ZHILISHCHNOYE I KOMMUNALNOYE KHOZYAYSTVO in Russian No 2, Feb 86 pp 29-30

[Article by E.P. Shchurkin, director of Gipronigaz, and V.G. Golik, deputy director for research: "Gipronigaz: New Developments"]

[Text] Considerable successes in the growth of our country's natural gas industry were achieved during the 11th Five-Year Plan.

A definite contribution to improvement of the industry's technical and economic level was made by Gipronigaz [State Science-Research and Design Institute].

In 1984, more than 1450 designs for the gas supply works for cities, settlements and industrial facilities were produced. Therefore, technical documentation was provided for more than 266 million rubles worth of construction work. Among the projects being carried out were a gas supply system for the Kalmyk and Chuvash ASSR's, the Kransodar Kray, Ivanovo, Tambov, Ulyanovsk, Murmansk and Kirov oblasts, 8 cities, 205 sovkhoses and kolkhoses and the construction and reconstruction of GNS [Natural Gas Supply Station] in four different cities. Projects were carried out to convert 132 factories to natural gas and these included the Kemerovo, Kirov and Syzran Heating and Electrical Power Plants and a bakery complex in Romodanovo in the Mordvin ASSR.

We have been making extensive use in our design work of programs for selecting efficient systems of fuel and natural gas supply to oblasts, using computers to design natural gas networks and choosing the best parameters for natural and compressed gas supply systems.

Scientific and technical development work is being done by the institute according to the RSFSR Ministry of Housing and Communal Management's five comprehensive scientific and technical programs on the following problems: improvement of planning; improvement of management; enhancing the economic mechanism's influence on improvement of the efficiency of natural gas management; development of methods and technical means of using compressed hydrocarbon gases in housing and communal management; use of polyethylene

pipes for building and repairing gas supply lines; methods and means of mechanizing labor-intensive processes to reduce manual labor at natural gas facilities; improvement of the reliability and safety of the operation of natural gas supply systems; improvement of the equipment and methods for supplying compressed gases; methods and means for efficient use of natural gas that consider improvement of air quality and environmental protection; improvement of equipment maintenance systems and repair of the gas equipment in public housing; development and introduction of automatic systems for controlling the gas supply to cities of the RSFSR; research on the possibilities of using pipes made from various grades of steel in the construction of natural gas supply lines.

Literature on technical norms that has been systematically prepared on the orders of Gosstroy and Gosgortekhnadzor USSR as well as the Natural Gas Directorate of the RSFSR Ministry of Housing and Communal Management has done much to improve the quality and technical sophistication of design documentation and construction work.

In the last five-year plan, the institute has worked on and introduced rules for technical operation and safety of gas-filling stations, rules for operation and personnel safety in natural gas management of the RSFSR, surplus norms in construction by sub-branch of gas supply systems in the 12th Five-Year Plan (instead of construction norm [SN] 411-81), norms on the duration of construction work and surplus norms by sub-branch of gas supply systems (in place of SN 440-79). In 1984, the first edition of construction norms and rules [SNiP] for designing gas supply systems (instead of SNiP 11-37-76) was prepared and a second edition is presently being worked on. 70 price schedules for construction of natural gas networks and their equipment have been worked out for the RSFSR and other soviet republics.

One of the very important institute projects during the 11th Five-Year Plan was the designing of a gas supply system for the city of Havana, Cuba.

A great amount of attention is being given to improving the organization and technology for construction of natural gas lines, their mechanization and expanding the assortment of materials used. For many years, Gipronigaz has been studying plastic (polyethylene) pipes as a possible substitute for expensive and scarce steel pipes. It has also prepared Technological instructions on the welding of pipes from low-density polyethylene, monitoring the quality of welds on pipes made from PVP and PNP and their connection to steel pipes in the construction of gas pipelines, Norms for jointed polyethylene-steel couplings, the Album of technological charts for the construction of natural gas pipelines from polyethylene pipes as well as a mobile installation for welding low-diameter polyethylene pipes, a set of attachments for repairing 110-225 mm polyethylene pipelines. etc. At the present time, methods are being studied for using instruments to monitor weld parameters.

In conjunction with the Ural Institute of Technological Scientific Research (Chelyabinsk) of the USSR Ministry of Ferrous Metallurgy, the institute has developed some proposals on the use of various types of electrically-welded

pipes (including weld-free pipes) to construct high-pressure pipelines. As the result of this work, there was published a supplement to SNiP 11-37-76 on the use of steel pipes in the construction of gas supply systems. In 1985, the institute determined that it would be possible and feasible to use spiral-welded steel pipes manufactured according to TU [technical condition] 102-39-78 with an anticorrosive coating to build natural gas pipelines.

One of the most important tasks of the institute is to improve the operation of gas supply systems and make them more reliable and safer. For this purpose, the institute has prepared and introduced albums of technological charts for basic operations in the maintenance and repair of pipelines, technological charts and instructions on basic types of emergency repair and repair work on pressurized pipelines, instructions on the investigation and calculation of failures and accidents in consumer gas consumption, a technological chart for the performance of work on existing low-pressure pipelines with the use of LORG accessories and instructions on the sequencing and periods for inspection of pipeline routes. The institute has also compiled design and technical documentation for series-manufacture of accessories for mechanization of welding and assembly operations in the pipeline repair work.

The institute has resolved a very important problem in the creation of a domestic design for a portable gas indicator for detecting gas leaks from underground lines. In 1983, this device went into series production. In 1984, the state certification commission received a low-inertia gas detector for large concentrations of methane gas. The working documentation on a filter for a mobile methane gas detection laboratory is being prepared. Experimental design work is being conducted on the modernization of a mobile laser laboratory mounted on a UAZ-452 and IZh-2715 truck.

In the 11th Five-Year Plan, the institute continued to solve the problems of large-scale automation and mechanization of labor-intensive processes in the supply and transportation of pressurized gases. Since 1982, it has been series-manufacturing the UPNB semiautomatic pressurized-gas bottle filler and since 1984, a rotary filler for 5-liter bottles and safety valves for reservoirs. It has developed and provided factories with documentation on the series-manufacture of equipment for mechanized continuous-production lines for filling and repairing 27-liter and 50-liter gas bottles and floor and console chain transporters. At the present time, it is also working on a rotary unit for filling 50-liter bottles and one for heat-filling 5-liter bottles, an installation for screwing and unscrewing valves and a series of other types of equipment.

For the organization of work at gas-filling stations, the institute has, in accordance with the present requirements of scientific labor organization, created and introduced typical plans for the organization of work places and the work of the equipment operators and others at gas-filling stations.

Instructions are being prepared on the design, construction and reconstruction of gas-filling stations for their large-scale mechanization along with methods of hydraulic design of pressurized gas-supply systems that provide gas in its

liquid phase. The compilation of designs of technological schemes for centralized pressurized hydrocarbon gas evaporating stations for regions with varied natural conditions is being completed. Work is also being carried out to install equipment for systems providing consumers with pressurized gas in its liquid phase.

For emergency and emergency-repair work, Gipronigaz has developed a series of designs for transport machinery. This includes emergency transport for the natural gas service, specialized repair transport and repair transport.

A great deal of attention has been devoted to efficient and safe operation of gas supply systems under conditions in which the gas contains greater amounts of butane as well as in the northern regions of the Russian Federation.

Gipronigaz's various types of gas evaporators (IGPO-15, REP-2, 5A, and the IP-04) have made it possible to provide an uninterrupted supply of gas in various climactic zones. In 1985, the IGPO-15A, a heat generator for the heating of pressurized-gas systems, went into series production. Work is also being done to ready production of an automated pressurized-gas evaporator specially developed for regions with air temperatures below -30°C . The state certification commission has received the underground electrical evaporator with an intermediate heat-transfer agent.

In order to enhance the efficient use of gaseous fuels, the institute has been looking for new and economical methods of burning gases in heating plants and is creating gas-burning equipment for the boilers of city and communal heating plants and home furnaces. It has developed a unit that can preheat water tubes with the help of gas nozzles.

At the present time, 12 factories under 9 different ministries are producing 500,000 units of 33 types of gas equipment, devices and apparatus designed by the institute.

To organize efficient monitoring of the entire gas combustion process in the boilers of domestic gas apparatus and provide metrological evaluation of the equipment and apparatus used, the institute prepared its proposals on the organization of the work of gas-industry laboratories and these have been in use since 1 January 1985.

An important area of the institute's activities is resolving the problems of economic management of the natural gas industry. It has prepared and introduced its proposals for certification of gas industry plants, an album of forms for initial documentation for gas-industry establishments, recommendations on the analysis of the economic activity of natural gas management and other instructional documents. Work is being conducted to improve pricing of services provided by natural gas industry establishments. A great amount of attention has been devoted to the development and introduction of automated process control systems for city gas supply systems. The institute is participating in the development of new foundations, principles and methods for creating automated process control systems for housing and communal management as well as principles for creating for cities

entire complexes of these control systems based on the technical resources of the public utilities.

The natural gas industry of the RSFSR has begun the introduction of the institute's large-scale production (service) quality control system.

The institute is finishing work on the theme of "Prospects for the development of the natural gas industry of the RSFSR for 1986-1990" which will be the basis for development of technical and economic growth plans for the Russian Federation's natural gas industry in the 12th Five-Year Plan.

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ENERGY CONSERVATION

ENGINEER REVIEWS BOOK ON INDUSTRIAL POWER CONSERVATION

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[Review under the rubric of "Specialist Commentary" by M. Berner, chief power engineer of AZLK, of book "Puti ekonomii energoresursov v narodnom khozyaystve" [Means of Economizing the Use of Energy Resources in Industry] by V. Belousov and Yu. Kopytov]. Publisher, place and date of publication not given.]

[Text] Energoatomizdat has just published V. Belousov and Yu. Kopytov's book "Means of Economizing the Use of Energy Resources in Industry".

The main premises of the USSR energy program above all call for an active energy-saving policy based on accelerated technical and scientific progress in all areas of industry and consumer life.

The purpose of the book is to explain and illustrate in each of the basic areas of the USSR energy program how fuel and energy resources can be more efficiently used.

One of these areas is the development of nuclear energy and the construction of large thermal electrical power stations that use less-expensive grades of coal. The other is the centralized production of heat energy. In 1986, the centralization factor was 77.4 percent and this indicates that work in this area has been successfully growing.

The authors discussed in detail practically all energy-intensive branches of industry such as ferrous and nonferrous metallurgy, chemistry, construction and machine-building. Thanks to scientific and technical progress, energy losses in various forms of industrial production have been reduced. Through the introduction of continuous steel-casting processes alone, energy losses have been reduced by 15 percent.

An important potential area of economic savings is the replacement of obsolete power equipment and technologies. The book provides numerous examples of the results of work in this area which cause the reader to wonder what has been done at his place of work to exploit these potential savings areas.

One of the most important directions taken by energy-saving technologies in industry is the use of secondary energy sources. There are possibilities for using these technologies in all branches of our industry.

Our industry has mastered the production of an entire complex of technical resources for data-processing and measurement systems that can calculate and monitor energy use and this in turn makes it possible to build multilevel systems of energy control. This would also solve the problem of operative monitoring and planning, book-keeping, predicting power demand and maximum loads, etc. Such a system for monitoring and calculating power consumption and demand very much helps to conserve energy use in industry.

The authors' statements are supported by concrete examples and the experience of leading factories. This book is a very good one because it discusses the complicated problems of energy conservation in terms of the practical operation of industrial plants and research institutes.

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